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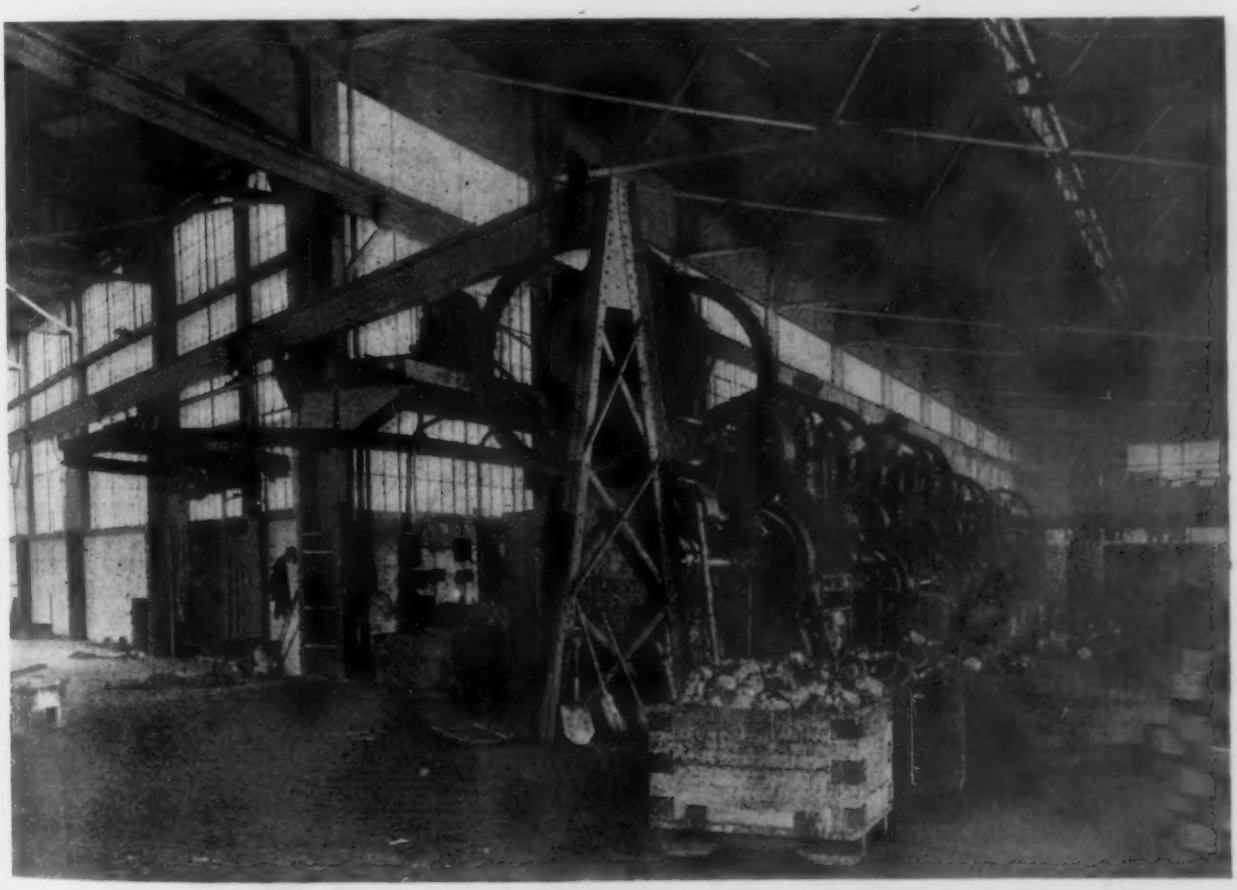
New Features in a Steel Stamping Plant

Kelsey Wheel Company's Shop Has a Balcony on Each Side for Motors and Dies and an Interesting Monorail System

A NEW plant for the manufacture of pressed steel stampings for automobiles that has a number of interesting features both in the construction of the building, the interior arrangement and the handling of material in the process of manufacture, has recently been placed in operation by the Kelsey Wheel Company, Detroit, Mich. This plant is a highly specialized one, as its stamped products are practically limited to flanges, brake drums, front and rear hubs, dust caps, pressed steel housings for rear axles and pressed steel wrenches. These products call for a range in stock from 1/32 to 15/32 in. in thickness, although only a small portion of the stampings are made of steel exceeding 9/32 in. in thickness.



The New Shop at the Junction Between the Main Building and the Wing. The Monorail Track Running Along One Side of the Press Room in the Main Building and Making a Circuit Through the Pickling, Annealing and Storage Departments in Another Building and Back Into the Press Room Is Shown Together with the Special A-Frame Supporting the Runway for the Crane Serving the Steel Storage, Shearing and Blanking Departments in the Wing and the Balcony for Mounting the Motors Driving the Presses

The building is 80 ft. wide and 313 ft. long, with a wing 48 ft. wide and 120 ft. long attached to the main section in the form of a V, the site not permitting the placing of the wing at right angles to the main building. The building frame is of structural steel, the roof trusses being supported entirely by the outside columns and leaving the floor entirely free from building columns. The columns are spaced 21 ft. on centers and are 27 in. wide up to the crane runway. The distance from the floor to the roof trusses is 28 ft. The outer walls are built of face brick up to 8 ft. from the floor level, and from the top of this wall to the roof trusses the absence of curtain walls permits continuous steel sash on the side walls. Above the roof is a monitor also fitted with continuous sash. Clear glass is used in all the sash and ventilating sections are also pro-

vided. The height of the building and the large amount of glass surface makes the plant unusually light and airy. The roof is of Hy-Rib reinforced concrete roofing furnished by the Trussed Concrete Steel Company, which also supplied the steel sash. The building has a creosoted wood block floor laid on 4 in. of concrete. Metal doors are provided throughout. In fact practically no wood is used anywhere in the construction, making the building a fireproof structure.

One of the interesting features of the building is a balcony 4 ft. wide that runs along the sides 14 ft. from the floor. This serves as a place for storing the dies and a convenient location for the individual motors that drive the presses. The balcony is of reinforced concrete with an iron rail along the outer edge and is supported by brackets underneath. Wiring is placed in conduits beneath the balcony floor. Across the front end of the building is a concrete mezzanine floor 25 ft. wide inclosed on the shop side by steel sash and glass, except that sheet steel is used in place of panes of glass in the sections near the floor. The mezzanine floor, which is used as a drafting room, affords a clear view of the entire floor in the main part of the plant. The mezzanine floor is on the same level as the balcony, to which doors lead from this floor on each side.

The main section is served by a 5-ton Northern crane. The crane rail, which is 23 ft. above the floor, is supported by 12-in. beams bolted to the columns. Instead of having the operator's cab at the side of the crane it is placed directly in the center out of the way of the rows of presses on the sides and gives the operator a better view of all parts of the floor. In the wing there is a 2½-ton

Arrangement of Buildings and Machines, the Latter being Indicated by Letters as follows: A—Air Compressor, D—Drilling Machine, DH—Drop Hammer, DI—Drum Inspecting Machine, E—Emery Wheel, I—Inspecting Machine, IB—Drum Inspecting Bench, L—Lathe, O—Hub Oven, P—Press, S—Shearing Machine, SH—Steam Hammer, T—Tumbling Barrel, and V—Vat.

Northern crane with a runway 16 ft. 4 in. above the floor. This crane runway extends under the crane runway in the main section, as can be seen in the halftone engraving. This overlapping of the cranes is a convenient arrangement for rehandling a load, one crane picking it up from directly over where it has been left by the other crane at the end of its runway. The front end of the main building is used for toolroom purposes, vertical and horizontal I-beams being erected in this part to carry the shafting.

The motors that drive the presses are mounted on special brackets on the balcony, the beams that are the main members of the brackets being bolted securely to the balcony floor. Slits are provided in the floor by channels used in its construction and these permit the bolting of the motor brackets through the balcony floor at any point desired. Artificial lighting is provided by 400 to 500 Cooper-Hewitt lamps hung about on a level with the bottom chords of the roof trusses.

The wing is used for steel storage and for shearing and blanking. Raw material is unloaded from cars on a siding that runs along one side of the wing. After shearing and blanking the blanks go to the main building for the succeeding operations. Reversing the usual arrangement, the presses face the wall and the finished parts go out on the opposite side of the presses into the wide center aisle. This method tends toward economy in the handling of finished stampings and the press operators are out of the way of material handled overhead by the crane and possible danger of injury.

At present nine Bliss presses are installed in the main section, one a double-crank straight sided press, one a toggle press and the remainder straight sided single-crank drawing presses. One of the latter has a 17½-in. crank and is said to be the largest press of this type ever built. In the wing there are a Toledo shearing machine and a blanking press of the same make. Pits are provided under the larger presses, and brake drums when drawn go through the presses to the pits. An Alvey-Ferguson conveyor will be installed to carry the drums from the pit and dump them on a table adjoining the press, where they are wiped and cleaned. This conveyor will be a portable motor-driven machine that can be moved from one press to another as needed.

The old stamping plant from which the press equipment will be moved to the new building will be used for pickling, annealing and for the storage of partly completed stampings. A very convenient conveyor system connects the new building with the old for carrying stampings from the presses to the pickling vats and annealing furnaces. This consists of two Brown Hoisting Machinery Company's electric trolley hoists operated on a monorail track suspended from the balcony along the greater part of one side of the new stamping plant directly in front of the presses and circling around into the wing and out along the side of the building, to which it is fastened by brackets attached to the building columns and then across a 45-ft. lattice work bridge to the old stamping plant, where it passes over the pickling vats and alongside of the furnaces. The monorail completes its circuit by passing under another lattice work bridge back to the main stamping building. The track is provided with necessary switches and the hoist can be run in either direction. These hoists are of 2-ton capacity and are operated by 1½-hp. motors. The trolley travel speed is 350 ft. per minute and the hoisting speed is 15 ft. per minute, the hoist having a hoisting rating of 500 tons per hour or a capacity of raising 1 ton 10 ft. fifty times per hour continuously without overheating the motor. Stampings are handled in the main stamping department in standard boxes 24½ in. high, 33 in. wide and 42 in. long, and with angle iron legs so that a chain can be swung around them for handling with the crane, or trucks with movable platforms can be run under them.

Some of the features of the heating system are quite interesting. The plant is heated by a forced hot-air system located at the triangular point of

the building. Outside air is taken from above the roof and forced through heating coils by a Sirocco blower and out into the building to conduits along the side walls. Sheet steel outlets extend up from these conduits at the side of the building columns, discharging the warm air into the building through 18 x 33-in. grilles about 3 ft. from the floor. At the front of the building just above the floor are two large intakes for the recirculation of air which passes through a tunnel that runs the length of the building at the center. Steam mains from the powerhouse that supply the radiation and the return lines are carried in this tunnel.

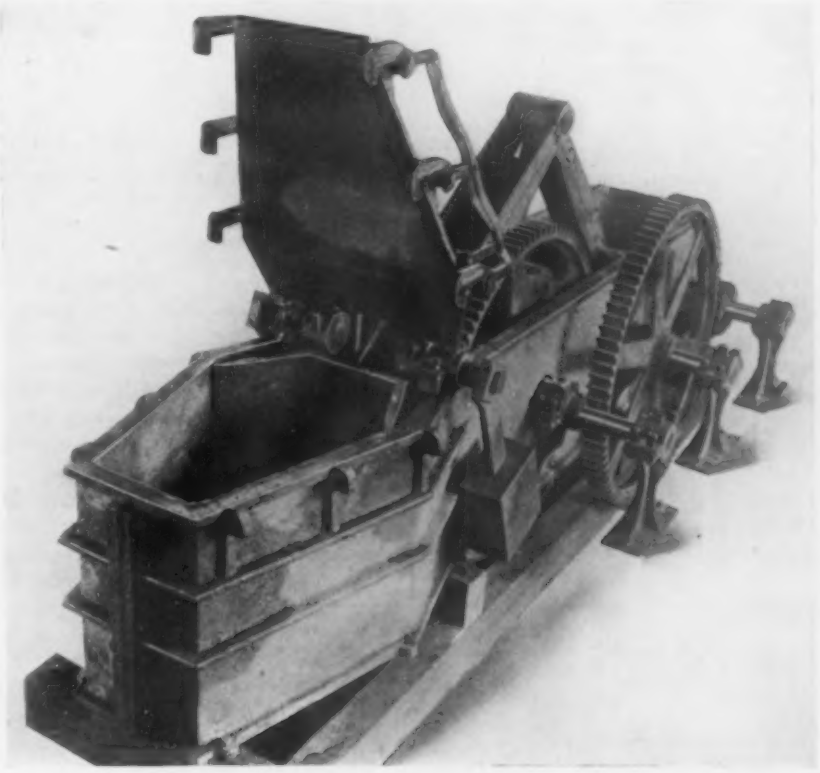
Press for Baling Light Steel Scrap

A new baling press for iron and steel scrap has been brought out by the Standard Pressed Steel Company of Ohio, Leader-News Building, Cleveland, Ohio. This is designed for baling No. 10 gage and lighter sheet scrap, and scrap up to No. 6 gage if it is soft and pliable, and bulky or fluffy steel turnings, wire, tin cans and other light bulky scrap.

The press is simple in design and construction. The charging box into which the material is deposited is 16 in. wide, 26 in. deep and 42 in. long. The material is compressed into a bundle slightly under 16 in. square or a size suitable for charging in open-hearth furnaces and weighing from 150 to 400 lb., depending upon the kind of material. When the box is filled the counterweighted hinged lid is clamped down, one lever of the lid being used for throwing in three dogs on each side, and the other for clamping. Then pressure is applied by a ram at the rear end of the charging box which is pushed forward. The ram has hinged wings which are forced in slightly as the ram is pushed forward, the wings moving along each side of the charging box, which becomes narrower toward the front of the machine.

The drive is through a friction clutch pulley, two rods and a connecting rod attached to the crankshaft between the two driving gears. As the crankshaft rotates the connecting rod is pulled down, bringing the two arms in a horizontal position with the ram pushed forward. Control is by a lever at the side of the machine. Its operation requires about 10 hp. and its maximum crushing power is given at 200,000 lb.

The machine is built entirely of steel except the counterweight. The frame is two steel castings 1½ in. thick, bolted in and reinforced with ribs at the charging box end. It occupies a floor space 7 x 14 ft. and weighs about 14,000 lb.



A Press Characterized by Simple Design and Construction for Baling All Kinds of Light Bulky Steel Scrap for Charging Open-Hearth Furnaces

In accordance with the Goodyear Tire & Rubber Company's recent announcement of a group insurance plan, the company has just made the first distribution of life insurance policies to the value of more than $2,000,000. The plan selected provides for all employees in factory, in office and in the company's branches. Policies for $1,000 have been issued to all the male employees who are members of the Goodyear Relief Association in good standing and policies for $500 to the female employees.

The Cost of Shells

Replying to questions, Major General Hughes of the Canadian Government made the following statements recently as to the prices paid by the British Government for shells made in England, Canada and the United States: The 4.5-in. Mark VI shell is the principal one made on this side of the Atlantic. The price in England was $10.33; in Canada, $10.45, and in the United States, $10.40 each, under the early Morgan contracts. The Canadian price was afterward cut to $9.80 and later to $7.35. The American price was reduced to $9.81 and the greater reduction in the Canadian price has created dissatisfaction in the Dominion. Steel forgings for 4.5-in. shells were originally $4.50 in England and $4.25 in Canada, while on later orders $3.60 and $2.95 have been paid. In England 6-in. shells cost $19.94 in the early stages of the war, and the Canadian and American price is now $16.85 apiece. Prices are being scaled down as the British Government finds itself able to get larger supplies at home. A long war might result in a further paring. The prices mentioned are for shells alone and do not include the cost of the powder used in firing them or of the cartridge cases into which the shells are loaded for use in quick-firing guns.

The Duluth plant of the Universal Portland Cement Company began operations Feb. 15. Mill No. 7, as it is called, has four kilns 150 ft. long, with a daily capacity of 4000 bbl. The plant adjoins that of the Minnesota Steel Company, which supplies the slag, and the limestone comes from Calcite, Mich. Power is furnished by the Great Northern Power Company from its hydroelectric plant at Thompson, Minn., on the St. Louis River, 15 miles distant; 4000 kw. at 66,000 volts is stepped down to 2200, and about half the current is used direct at this voltage and the other half at 220 volts for the smaller motors.

The Gramm-Bernstein Company, Lima, Ohio, is reported to have taken an order from Birmingham, England, for between 300 and 400 motor trucks. These are wanted for commercial purposes rather than for war use.

Steel Castings for American

Some of the Contributions of Chester, Pa., Frame and Rudder Frame—Unique Distinction Notable Castings

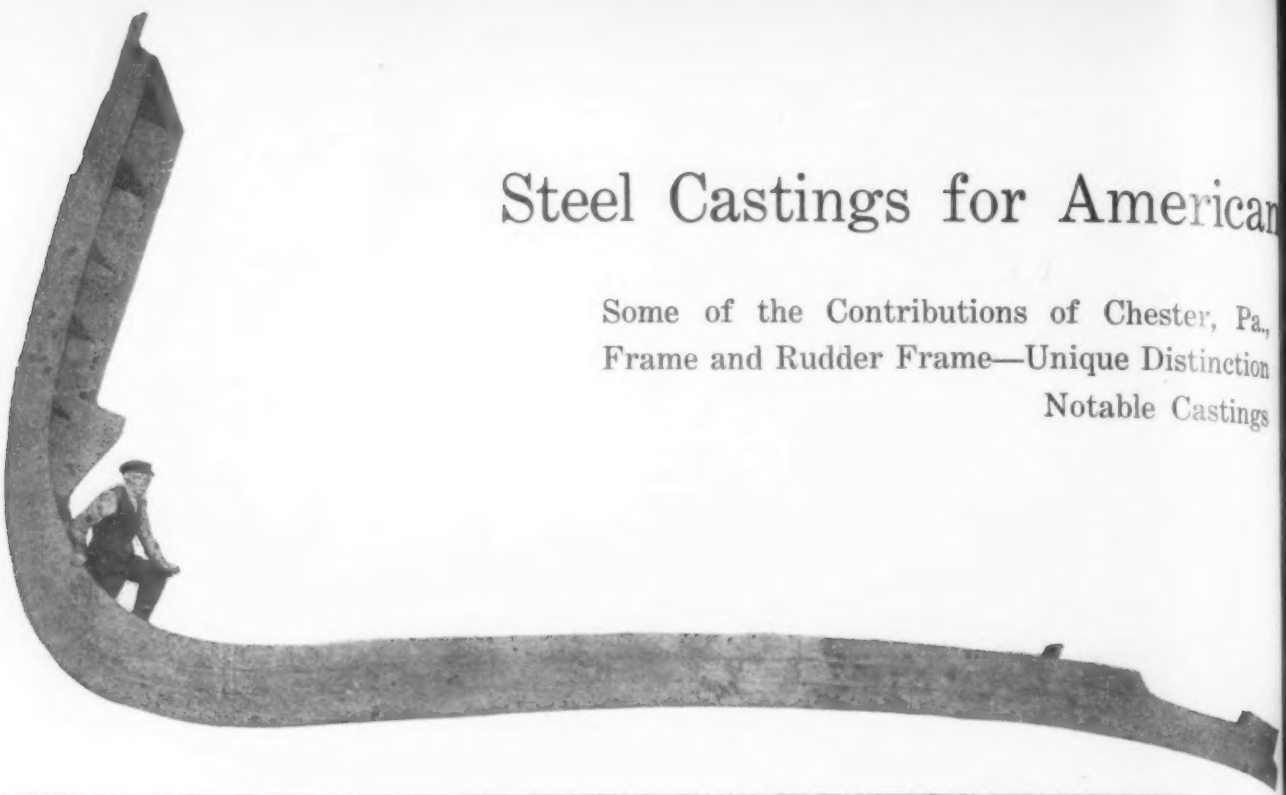


Fig. 1—The Stem Casting for the U. S. Superdreadnought Pennsylvania Which Has Just Completed Its Trial Trip Off the Coast of Maine. This casting was made as one piece by the American Steel Foundries at Chester, Pa. It weighed 20,770 lb. and was of high tensile metal. It forms the bow of the battleship. The Pennsylvania has twelve 14-in. guns, mounted in superimposed turrets of three each, bow and stern, the gun yokes being nickel steel castings

STEEL castings are an essential factor in naval preparedness. They constitute a most important part of modern battleships and other naval vessels. Many of them are very large and difficult to make. The production of battleship castings has been a matter of only comparatively recent growth, and has been specialized in by only a few producers. As the modern United States navy has grown in the past 20 years, new types and new kinds of castings have been demanded, presenting to the foundryman many new problems.

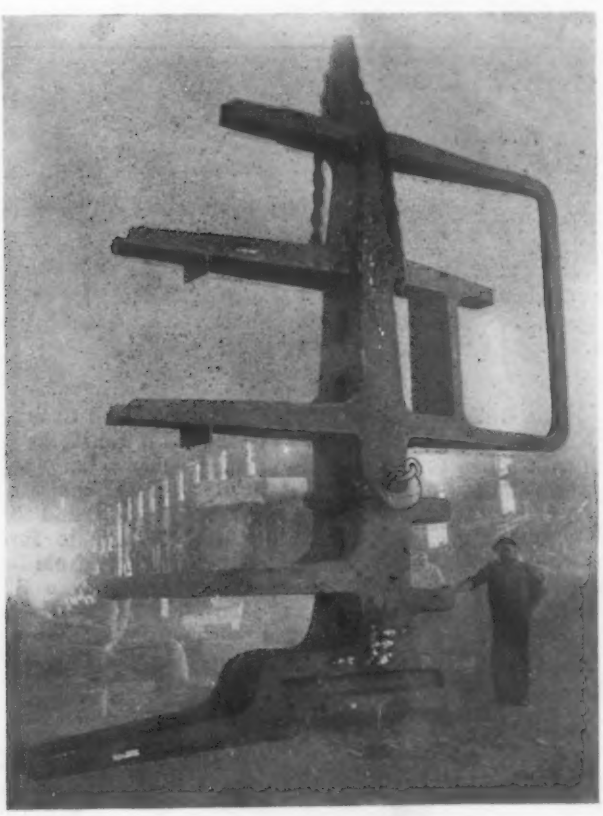


Fig. 3.—The Rudder Frame for the Pennsylvania, Cast as One Casting by the American Steel Foundries, Chester, Pa. It weighed 51,990 lb. and much foundry space was required to handle it

Probably 90 per cent of the steel castings required to build the new navy of the United States has been made in Chester, Pa. In that city are located several of the most important open-hearth steel foundries in the country. In their employ are many men who have spent their lives in the various foundries and have helped to develop this remarkable phase of the foundry business, so that this district is famous for the battleship and other ship castings it has produced, not only for our own navy, but for those of other countries. Many intricate and large castings for the present additions to the navy are still being made by Chester foundries.

THE TYPES OF LARGE CASTINGS

Four important types of large castings enter into the construction of the modern battleship—the stern frame, the stem, the rudder frame and the struts. As the size of the battleship has increased, the design and weight of these various types have changed until to-day some of them present unusual problems and difficulties in molding and casting. In addition, those for other navies are usually different. For merchant ships the steel castings are radically different in design and weight, but not so difficult usually to produce, though there are exceptions. The latest battleships, such as the Arizona, Mississippi and California, require about 343 gross tons of steel castings; the earlier type, as the Kentucky, only 123 tons—a decided expansion.

The molding and casting of a battleship stern frame, or even stem, are undertakings requiring much time, care and patience. The mold for the stern frame is often made in several parts, and is always baked thoroughly in an oven. The various parts are molded in flasks which are carefully joined together, usually in a casting pit of large dimensions. The completed mold is often as large as a small-sized house. It is usually necessary to pour such castings with two ladles, one delivering metal at each end of the mold or one supplementing the other. This is necessary not so much because of the weight of the casting itself as because of the length and the fact that the metal must travel a considerable distance and fill up a comparatively

attleships and Merchantmen

oundries to the Evolution of the Stem, Stern f the Delaware River Town in This Work— or the Pennsylvania

BY EDWIN F. CONE

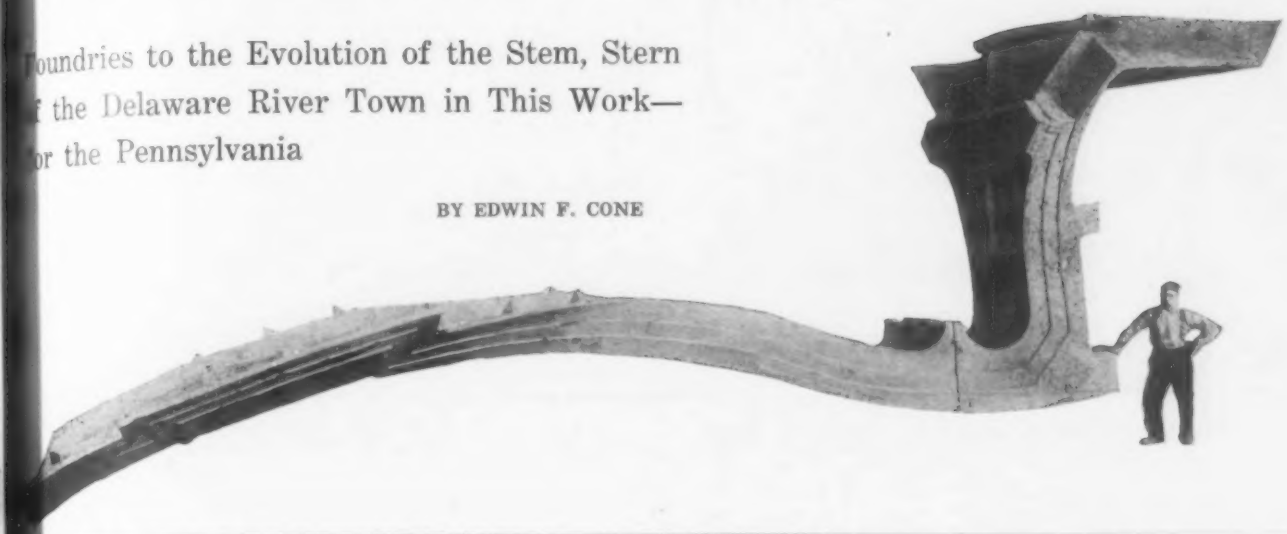


Fig. 2.—The Stern Frame for the U. S. Superdreadnought Pennsylvania Which Forms the Backbone of the Stern of the Battleship and to Which the Rudder, Fig. 3, is Attached. This was cast in two sections, as indicated by the dividing line, by the American Steel Foundries, Chester, Pa. The upper section weighed 37,990 lb. and the lower, 21,836 lb. or a combined weight of 59,826 lb. Not many years ago these were cast as one casting.

thin space. The stem and rudder frame are usually made as one casting, but the stern frame as two, though a few years ago it was poured in one mold.

THE GRADE OF METAL USED

The steel for such castings is almost universally acid open-hearth and of the best quality possible. Special care is taken in selecting the charge and in finishing the steel, because the design of a stern post in particular is such that it may easily crack or develop defects that will not pass the very severe United States Government inspection. Until recently all such castings were made of mild steel having a carbon content of 0.25 to 0.30 per cent, with a tensile strength of 60,000 to 70,000 lb. per square inch. But in recent years the tendency has been to make a stern frame or stem lighter in weight, and therefore the metal now prescribed is 0.40 per cent carbon steel with a minimum strength of 80,000 lb. per square inch. The chemical requirements otherwise call for manganese, 0.60 to 0.70 per cent.; silicon, 0.25 to 0.30 per cent; sulphur and phosphorus not over 0.05 and 0.06 per cent respectively. In the case of the higher tensile strength metal an elastic limit of not less than 45 per cent of the tensile strength is required, a minimum elongation of 17 per cent in 2 in., and a minimum reduction of area of 20 per cent. In the case of the mild steel an elastic limit of not less than 45 per cent of the registered tensile strength is demanded, as well as a minimum elongation in 2 in. of 22 per cent and a minimum reduction of area of 25 per cent—not a difficult specification to meet where foundry and furnace practice is progressive. In any case the steel must be very hot and uniform, the two heats which are tapped simultaneously being as near alike chemically as possible.

The pouring itself is not a simple proposition. In casting 25 tons from each of two ladles into one mold extreme care and skill are necessary, because an accident of any kind is expensive. The loss of the entire casting by a break-out of metal from the mold has occurred more than once with spectacular results. When it is considered that the molding of such a casting takes often two months and more and the metal consumed often as much as 35 to 40 tons, the financial loss is a large one.

The cleaning of such a casting is an expensive undertaking. After it has remained in the flask ten days to two weeks it is removed to the cleaning department, where sink heads, often equal in weight to the weight of the casting, are removed.

The annealing must be thorough. It is a difficult process, requiring a large and efficient annealer. Satisfactory heat treatment always involves slow heating to a temperature above the recalescence point and then slow cooling in the closed annealer.

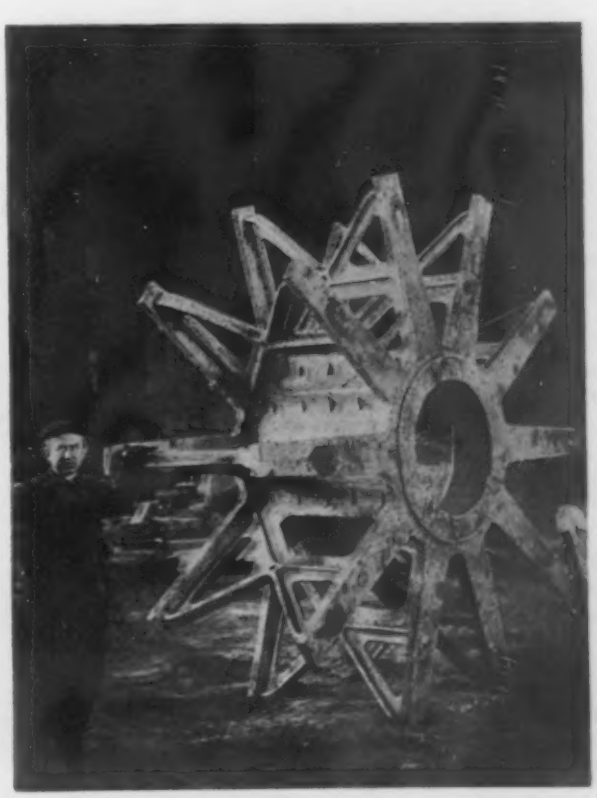


Fig. 4.—A Drum Head for One of the Turbine Engines of the New U. S. Superdreadnought Pennsylvania, a Most Difficult Steel Casting to Make. It weighed 8060 lb.

Fig. 5.—Size and Character of the Stern Frames for the Earlier and Smaller U. S. Battleships, Such as the Kentucky and Illinois. This casting was made in one piece by the Penn Steel Castings & Machine Company, Chester

The structure thus obtained is always pearlitic. While a sorbitic structure, resulting from quick cooling, would greatly improve the static properties of the metal, the consequent internal strains and warping of the casting would be serious.

Besides the four types of large castings for battleships, many important and by no means small steel castings are required in the construction of a modern battleship. The turbine-driven ship has developed the need of a cast-steel turbine wheel, Fig. 4, very large and intricate, calling forth the ingenuity of Chester's skilled labor. In addition there are many important hull and engine castings, such as hawse pipes, bed plates, pistons, etc., each requiring annealing, physical tests and exacting surface inspection by the Government before acceptance. The development of the large gun turrets has called for large turret roller castings, made in segments of a circle and of high carbon steel. For the large 14-in. navy guns an important yoke casting of nickel steel is now made in Chester which was formerly a forging.

THE LARGE FOUNDRIES MAKING SHIP CASTINGS

Three large Chester steel foundries now specialize in battleship castings. Two of these have been the pioneers in this work since the new modern United States navy was started late in the 1890's. They all constitute a group different from any other foundries in this country as being the only ones where such work is successfully and continually done. The pioneers in this class of work were the American Steel Casting Company, since 1902 the Chester plant of the American Steel Foundries, and the Penn Steel Castings & Machine Company.

The Penn Steel Castings & Machine Company

The two battleships which may be regarded as the beginning of the new navy of the United States were the Kentucky and the Kearsarge, built by the Newport News Shipbuilding & Dry Dock Company, Newport News, Va., and delivered to the Government in September and October, 1899. The castings for these were furnished by the Penn Steel Castings & Machine Company. These vessels were of only 7087 tons each, compared with 32,000 tons for those now building, the Mississippi and the California. The size and design of the stern frame for these early vessels is shown by Fig. 5. This frame was cast in one piece, was of mild steel and was much smaller than the same casting for the battleship of to-day, as a comparison with Fig. 2 will demonstrate. The upper section of the Pennsylvania's stern frame in Fig. 2 is alone equal to the entire stern frame of the early type.

The Penn Company has continued to produce many large and small intricate castings of high-grade for the United States navy and for merchant vessels. One of the illustrations, Fig. 9, shows the design of the stem for the battleship Utah, cast by the company about 10 years ago. While not large in comparison with a stern frame, it is a difficult casting to make. Another illustration, Fig. 7, shows a stern frame for a torpedo boat, much smaller than that for a battleship, but more intricate in design.

Steel castings for merchant vessels are entirely different from those of battleships. All the large foundries in Chester have furnished this type, excellent examples of which, as made by the Penn Steel Castings & Machine Company, are illustrated. Fig. 12, showing such a stern frame, reveals the radical difference.

The largest merchant rudder castings on the freight carrier in Fig. 10 are typical castings of to-day. They are 26 ft. 2 in. long and 10 ft. 6 in. wide, each weighing 40,000 lb., made for the International Navigation Company and shipped to the Clyde Bank Engineering & Shipbuilding Company, Glasgow, Scotland. The steel foundries in England refused to make them in three sections. The Penn Company had excellent success in the first trial.

The American Steel Foundries

The Chester plant of the American Steel Foun-

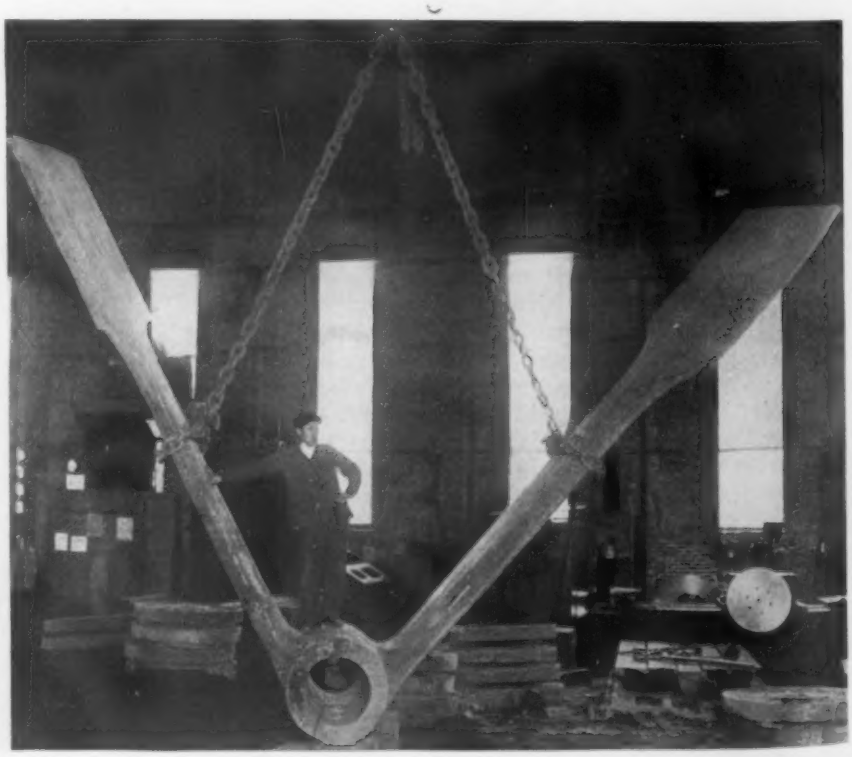


Fig. 6.—One of the Struts Made by the American Steel Foundries of Chester, for the Argentine Battleships. These differ but little from those used on all large U. S. battleships. This one weighed 27,830 lb. and was mild steel

dries is unusually interesting for the varied castings it has made for battleships and other vessels. It was at this plant, then operated by the American Steel Casting Company, that the large castings for the battleships Oregon and Ohio were made in 1900 and 1901 and shipped overland to the Union Iron Works at San Francisco, where these ships were built—an important and expensive undertaking.

About the same time the William Cramp Ship & Engine Building Company at Philadelphia was constructing for the Russian navy the battleship Retvizan of 12,775 tons displacement and the cruiser Variag of 6500 tons displacement, delivered to the Russian Government on March 23, 1902, and March 23, 1901, respectively. All the castings for these vessels were made at the American foundry at Chester and inspected there by Russian inspectors. To-day these two vessels, under other names, fly the flag of the Japanese Empire, having been captured by Admiral Togo in the Russo-Japanese war. Very recently cables state that the Variag has been restored to the Russian navy by purchase.

Castings for the battleship Maine, which replaced the old Maine, were made at this foundry for the Cramp Company. This battleship had a displacement of 12,500 tons, and left the company's yard Aug. 15, 1902. Other navy units for which this Chester foundry has furnished practically all the castings are the following:

	Delivered to the Government	Gross Tonnage
Illinois	September, 1901	6,802
Missouri	December, 1902	7,384
Virginia	April, 1906	9,475
Louisiana	May, 1906	10,417
Minnesota	June, 1907	10,417
Delaware	February, 1910	....
Texas	March, 1914	....
Pennsylvania	Under construction	31,400
Mississippi	Under construction	32,000

All of these are the product of the Newport News Shipbuilding & Dry Dock Company.

Of special interest are the castings furnished by this foundry late in 1910 for the two Argentine battleships, Rivadavia and Moreno, built by the Fore River Shipbuilding corporation and the New York Shipbuilding Company, respectively. The stern frame for these ships is shown by Fig. 7. These frames differ considerably from the design of an American battleship and are much heavier, each one weighing, ready for shipment, 57,100 lb. To pour one of these required about 80,000 lb. of steel. The struts, Fig. 8, furnished these vessels were not insignificant. They are the castings, two to each battleship, which hold the propeller shaft after it has extended beyond the hull. Each one weighed 27,830 lb., requiring about 38,000 lb. to pour. They are not different in design from those used on United States battleships.

Fig. 7—A Stern Frame for a U. S. Torpedo Boat as Furnished by the Penn Steel Castings & Machine Company. It is a difficult casting to make, the section being thin and the metal mild steel

Besides the above many other castings for battleships built at the Brooklyn Navy Yard as well as various private yards were made at this foundry. All had to be annealed, tested and inspected, and the writer's experiences in piloting these castings through the rough seas of United States as well as foreign inspection were both serious and amusing.

The general character of the modern type of large steel casting as made at Chester is shown by some of the illustrations. Fig. 2 is the stern frame for the battleship Pennsylvania, made in two sections, an upper and a lower. This vessel has very recently had her trial trips off the coast of Maine. The upper section had a shipping weight of 37,990 lb. and the lower a weight of 21,830 lb., both of high carbon (0.40 per cent) metal with a minimum tensile strength of 80,000 lb. per square inch. They were shipped on Christmas, 1913. A similar casting for the Delaware was made in one piece, but the weight was not much less than the combined weight of the Pennsylvania's.

Another modern type of casting shown is the stem, Fig. 1, for the battleship Pennsylvania, a most difficult casting to make. This is also high-carbon and weighs about 20,000 lb. It is the casting that forms the main rib on which the bow of the vessel is built. The maximum weight for stem castings for battleships was reached in the Virginia type, which weighed about 50,000 lb. The lower section

Fig. 8—The Stern Frame for One of the Argentine Battleships Built by the New York and Fore River Shipbuilding Companies. This casting was made by the American Steel Foundries, Chester, and weighed 57,100 lb. It was mild steel

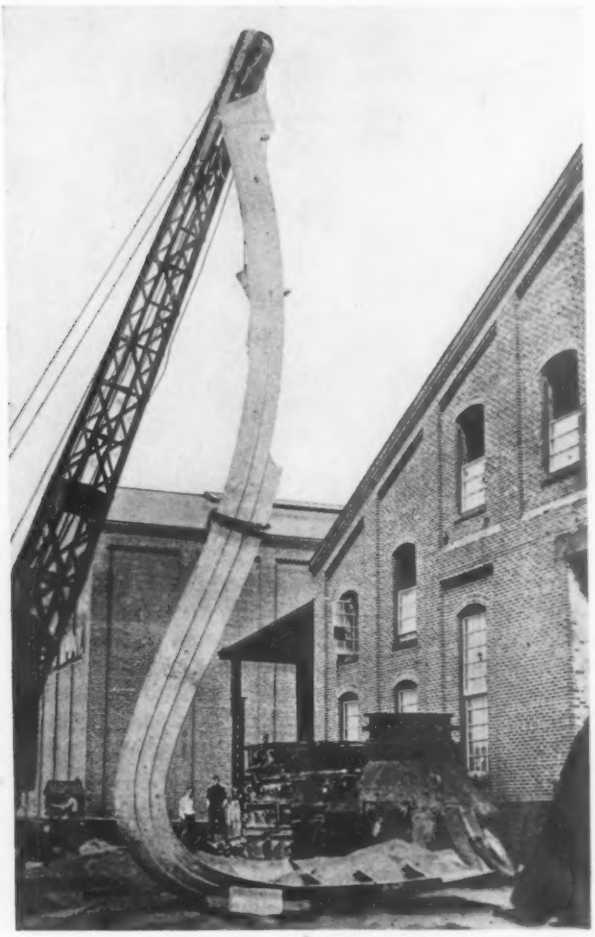


Fig. 9.—Stem Casting for the Battleship Utah. It was made in one piece by the Penn Steel Castings & Machine Company, Chester

contained a ram which represented the greater part of this weight, the idea being that a vessel could ram the enemy and then back away without much danger to herself. Gun development soon attained such proportions, however, that a battleship could not get near enough to an enemy to inflict any damage. Since then stem castings have been designed considerably lighter, that for the Mississippi weighing only 20,280 lb., the vessel's gross tonnage being 32,000 tons against the Virginia's only 9475.

The Chester plant of the American Steel Foundries, in addition to turbine and other difficult navy castings, has furnished unusual merchant ship castings such as the stern frame made in three sections for the North German Lloyd liner, the Princess Irene, in 1911 (described in THE IRON AGE of June 29, 1911), weighing over 73,000 lb. and made in two weeks; also the spectacle frame or stem casting for the American liner New York, Fig. 14.

The Federal Steel Foundry Company

The third foundry of prominence, which has specialized in these castings, is the Federal Steel Foundry of Chester. It is owned by the Cramp Ship & Engine Building Company, but it also produces castings for other shipyards. At present it is furnishing important castings for the battleship Idaho, being built by the New York Shipbuilding Company, Camden, N. J.

This foundry has not been long in existence, and it differs in its product in one important particular. It makes its steel in a basic open-hearth furnace, but it uses high-grade scrap such as is used in acid open-hearth furnaces, and it pours the same kind of castings as made by the acid foundries.

A metallurgical advantage claimed is that the steel is better than regular basic steel in that less refining is necessary because starting with purer stock; that a better and tougher steel than from the acid furnace using the same stock is obtained; that it is cheaper, and that it is lower in both phosphorus and sulphur than the acid metal and less liable to be defective when cast. The writer found the appearance of the green castings recently produced there, especially of the intricate one shown in Fig. 11, as near ideal as is often seen, as to cracks, dirt, etc., while the physical properties of the annealed metal are of a very high order.

The character of the annealed metal produced by this foundry is indicated by the composition and physical properties of this casting, which are as follows:

Carbon, 0.35 per cent; manganese, 0.68 per cent; silicon, 0.338 per cent; sulphur, 0.041 per cent, and phosphorus, 0.025 per cent.

Tensile strength, 83,750 lb. per sq. in.; elastic limit, 43,750 lb. per sq. in.; elongation in 2 in., 24 per cent; reduction of area, 37.9 per cent; cold bend of 1 in. x 0.5. in. bar, 140 deg.

It will be noticed that the 80,000 minimum tensile strength specified by the Government for this casting has been met, not by aiming at 0.40 per cent carbon, but by using a lower carbon and a higher manganese metal—a practice which insures a strong and tough metal.

It is contended that this exceptional furnace practice is the cause of success. It is at least true that it has been generally accepted that castings requiring final machining nearly all over could only be made successfully from acid open-hearth steel.

While the output of this company is not as large as that of the two others—about 800 tons of finished castings per month as compared with 1800 to 2000 tons—it has produced and is producing now nearly as large and difficult castings as those already mentioned for both United States navy and merchant ships. A merchant stern post which this company produced is illustrated, Fig. 13. Two of these were made for the steamers Great Northern and Northern Pacific, built by the Cramp Company not long ago. The casting required 70,000 lb. of steel and its outside dimensions were 26 x 26 ft. Fig. 11 shows a bow casting, a combination stem and hawse pipe, for the new United States battleship Idaho—a most

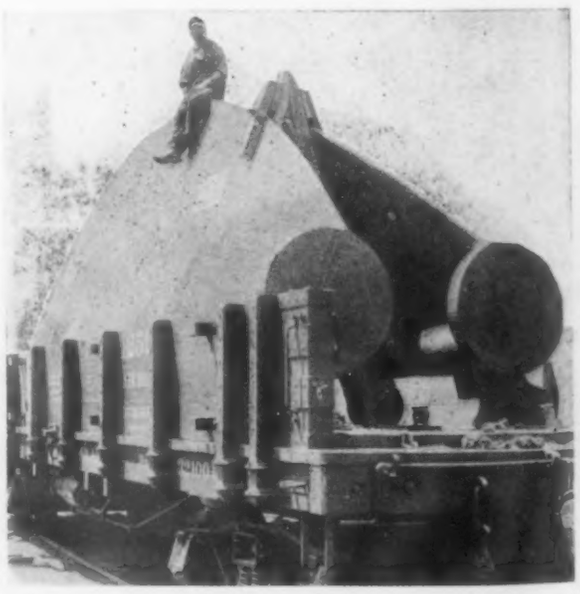


Fig. 10.—The Very Large Cast Steel Rudders, 40,000 lb. Each. Furnished a British Shipbuilding Company by the Penn Steel Castings & Machine Company. They are mild steel, 0.25 per cent carbon

difficult casting to make and the first one of its kind ever poured.

OTHER FOUNDRIES OF THE DISTRICT

The Baldt Steel Company, located about 20 miles south of Chester, at New Castle, Del., has recently done considerable work in this special field, and is now furnishing large and small acid open-hearth castings to various large shipyards. The Seaboard Steel Casting Company of Chester, a large open-hearth plant, in its early history made a considerable number of Government and merchant castings similar to those described, but recently has confined its efforts more especially to other lines of work. For every battleship there are a great many small steel castings, nearly all of which the large foundries used to produce, but in recent years these have been made by the smaller foundries. Conspicuous among these is another Chester foundry, the Eagan-Rogers Steel & Iron Company, which has a large output of converter castings.

Before the advent of steel castings for such parts as stern frames and stems these were made of wrought iron. In fact, to-day this metal enters quite extensively into the construction of merchant but not Government work. Many of the earlier wrought-iron forgings for this class of work were made by McPherson & Willard, now the Bordentown Forge & Machine Company, Bordentown, N. J. The Reading Iron Company, Reading, Pa.; the Cleveland City Forge & Iron Company, Cleveland, Ohio, and the Delaney Forge & Iron Company, Buffalo, N. Y., also made these earlier forgings, and the latter company still makes them.

The extent of the contributions to the United States and other navies, which have made the Chester district famous, can be appreciated by the accompanying table of battleships built in recent years or now building by the four leading Eastern shipbuilding companies and others. A repetition in names indicates the replacement of an old battleship by a new.

The progressive development in size, as indicated in the table, has meant a corresponding advance in steel foundry practice and equipment. The introduction of the turbine has brought new problems involving many very difficult castings. Besides the large tonnage of castings required for the foregoing, these foundries have also furnished many

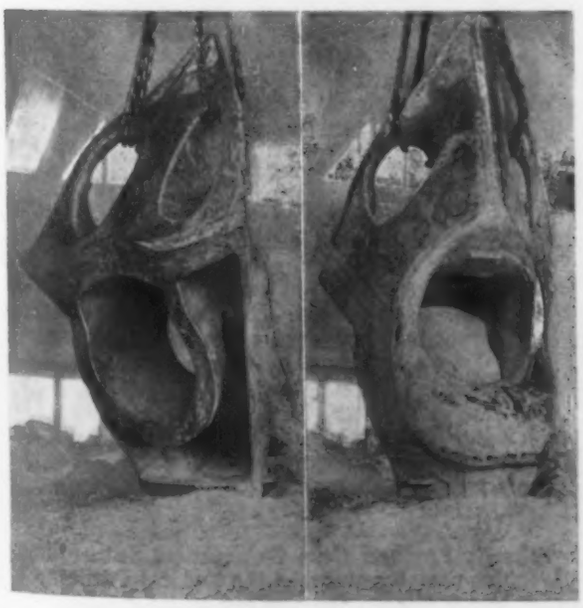


Fig. 11.—The First Casting of the Kind Ever Made—A Bow Casting, 25,000 lb. Weight, Furnished the New York Ship Building Company for the U. S. Battleship Idaho by The Federal Steel Foundry Company, Chester, Pa. The view of the back of this casting shows how difficult the core work is

Fig. 12.—A Stern Frame for a Merchant Ship, Single Screw, Furnished by the Penn Company. It is one piece and is a representative type as made by other foundries

Table of Battleships and Dreadnoughts for Which the Chester Foundries Have Furnished Steel Castings in Recent Years

Builder	Battleship or Dreadnought	Displacement, Gross Tons
Newport News Shipbuilding & Dry Dock Company, Newport News, Va.	Kearsarge	7,087
"	Kentucky	7,087
"	Illinois	6,802
"	Missouri	7,384
"	Virginia	9,475
"	Louisiana	10,417
"	Minnesota	10,417
"	North Carolina	....
"	Delaware	....
"	Texas	....
"	Pennsylvania	31,400
"	Mississippi	32,000
William Cramp Ship & Engine Building Company, Philadelphia	Maine	12,500
"	Idaho	13,000
"	Mississippi	13,000
"	South Carolina	16,000
"	Wyoming	26,000
"	*Retvizan (Russian)*	12,750
"	*Variag (Russian)*	6,500
New York Shipbuilding Company, Camden, N. J.	Washington	14,500
"	Kansas	16,000
"	New Hampshire	16,000
"	Michigan	16,000
"	Utah	21,842
"	Arkansas	26,085
"	Oklahoma	27,500
"	Idaho	32,000
"	*Moreno (Argentine.)*	27,566
Fore River Shipbuilding Corporation, Quincy, Mass.	New Jersey	15,000
"	Rhode Island	15,000
"	Vermont	16,000
"	North Dakota	20,000
"	Nevada	27,500
"	*Rivadavia (Argentine)*	31,000
New York Navy Yard	Florida	....
"	New York	....
"	Arizona	31,400
"	California	32,000
Union Iron Works, San Francisco, Cal.	Oregon	....
"	Ohio	....

for torpedo boats and torpedo boat destroyers as well as for submarine and army ordnance, most of these being very intricate and of small tonnage. In

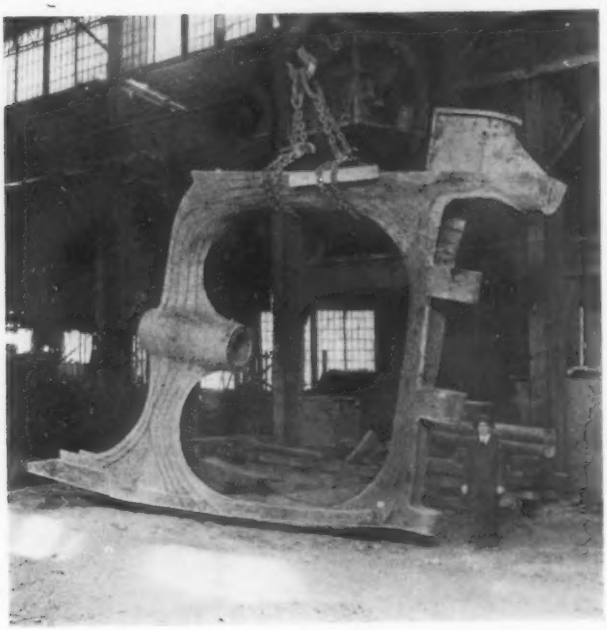


Fig. 13—A Large Stern Frame for a Merchant Ship Made by the Federal Steel Foundry Company of Chester. Two of these castings, each requiring about 70,000 lb. of metal to pour them, were cast. They differ decidedly from those represented by Fig. 12.

addition the castings required for the numerous large merchant vessels, built or now building by the large shipbuilding companies, are by no means a small item.

A striking feature of the foregoing development has been the lack of inclination to use anything but plain carbon steels. None of the alloy steels has made any incursion into this field, whereas in locomotive construction vanadium steel castings are widely used.

The future holds out much promise for the increasing importance of these and other foundries in naval and merchant marine development. New foundry problems will arise and new types of castings will be called for, but it need not be doubted that all such demands will be fully met.

The Charles Abresch Company, Milwaukee, Wis., operating a large machine shop, with a factory for making automobile bodies and other vehicle parts, declared March 1 in favor of the open shop. On that day its agreement with the unions expired. The announcement was followed by a walkout of 125 to 150 workmen. In addition to demanding a closed shop, the strikers asked for a 10 per cent increase in wages and a 54-hr. week. The Abresch Company is firm in insisting on an open shop and states that not much difficulty is being encountered in keeping the production up to normal.

Fig. 14—The Stern Frame for the American Liner New York, Sometimes Called a Spectacle Frame—a Very Unusual and Difficult Casting to Make. It was furnished the Cramp Ship & Engine Building Company by the American Steel Foundries of Chester, and weighed about 80,000 lb.

Iron and Steel Institute Members

At the monthly meeting of the board of directors of the American Iron and Steel Institute in New York, March 10, ten persons were elected to associate membership, five of whom being eligible to active membership will be placed on the active list as vacancies occur. Seventeen nominations were pending before the above action was taken, so that seven are left on the waiting list. Those elected to associate membership are the following:

Harry S. Beale, Eastern sales manager, Blaw Steel Construction Company, New York.

Frederick N. Beegle, president Union Drawn Steel Company, Beaver Falls, Pa.

*John Howard McCloy, salesman, La Belle Iron Works, Steubenville, Ohio.

W. N. McIlravy, vice-president American Coal Products Company, New York.

*J. Lester Manthe, assistant superintendent blast furnaces, National Tube Company, McKeesport, Pa.

*Hugh N. Pendleton, superintendent skelp mill, National Tube Company, McKeesport, Pa.

*William T. Snyder, superintendent electrical department, National Tube Company, McKeesport, Pa.

Harry G. Stoddard, vice-president and general manager, Wyman-Gorden Company, Worcester, Mass.

William B. Todd, assistant general manager of sales, Union Drawn Steel Company, Beaver Falls, Pa.

*Sterling G. Valentine, superintendent Oxford furnace, Empire Steel & Iron Company, Oxford, N. J.

*Placed temporarily on associate list, to be transferred to active list as vacancies occur.

The tenth general meeting of the institute will be held in New York, probably at the Waldorf-Astoria, on May 26 and 27.

Spring Meeting of Mechanical Engineers

The spring meeting of the American Society of Mechanical Engineers, which will be held at New Orleans, April 11-14, with headquarters at the Hotel Grunewald, will consider the question of "Industrial Preparedness—What It Means and How It Can Be Accomplished," introduced by a paper by Spencer Miller, Lidgerwood Mfg. Company, New York. The professional session on Thursday morning will be given over to papers presented by the local engineering societies dealing with subjects of local interest, such as the evolution of low-lift pumping plants in the Gulf coast country, tests on the capacity and economy of multiple-effect evaporators and the mechanical equipment of the New Orleans docks. The session of Friday morning will be devoted to miscellaneous papers on the measurement of flow of liquids and related topics, dynamic balancing of rotating bodies, heat flow and the measurement of viscosity. The possible excursions include visits to salt and sulphur mines, oil refineries, sawmills, wood distillation and rice irrigation plants, and oil and gas fields in the surrounding territory. As usual, the evenings will be occupied with the social features, and on Wednesday evening an address will be delivered by W. B. Thompson, commissioner of public utilities of New Orleans.

Detroit Foundrymen's Association

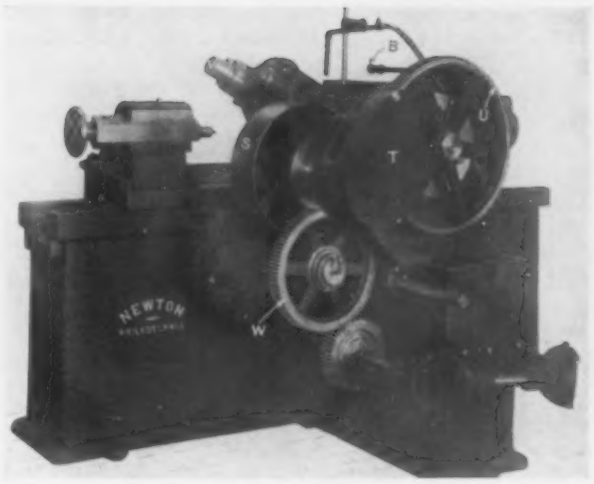
The Detroit Foundrymen's Association, Detroit, Mich., was entertained at a smoker and cabaret show at the Cadillac Hotel on the evening of March 10. About 300 were present. After a short business session, Standish Meacham, advertising manager of Rogers, Brown & Co., gave a talk on the subject of "From Mine to Molder," illustrated by moving pictures.

A. F. S. Blackwood, Michigan Steel Castings Company, is president of the association, and W. A. Fletcher, American Blower Company, is secretary. A number of new members were admitted during the business session.

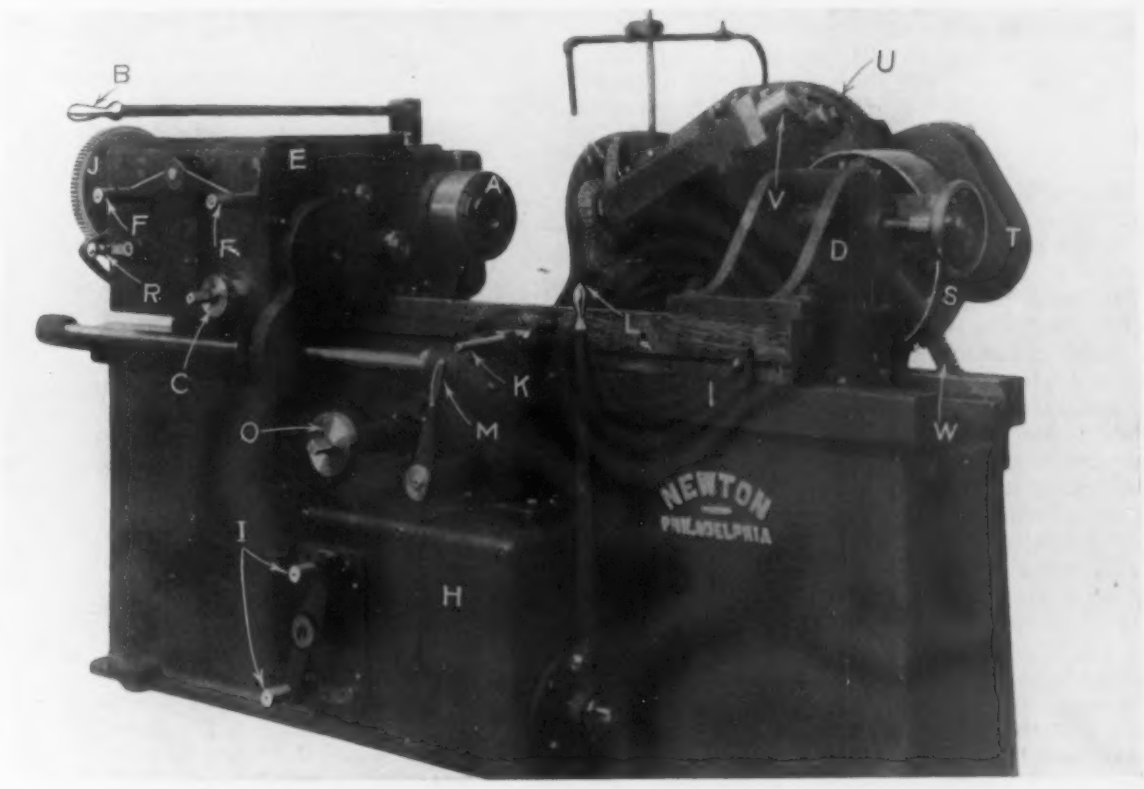
The By-Products Coke Corporation, South Chicago, Ill., which recently absorbed the Federal Furnace Company, has increased the number of its directors from 10 to 14 to include representation of the Federal Furnace interests. The new directors are H. G. Dalton, Harry Coulby and E. L. Whittemore, of Cleveland, and Clayton Mark, Chicago.

Milling Machine for Cutting Worms

A new worm milling machine has been placed on the market by the Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa. It is in a sense a misnomer to designate the machine as a new one, since it was developed originally about fifteen years ago for the builder's own requirements, but the present form embodies a number of improvements and is being offered to the trade for the first time. Among the changes which have been made in the design of this machine are increases in the feed and the size of the cuts that can be taken, as well as the maintenance of greater accuracy. In addition to these improvements it is pointed out that it is also possible to effect reductions in the cost of doing this work by reason of savings in the amount of time required for setting the work and also the cutter. All of the features of the machine are controlled from the front with the single exception of the spindle head rotating worm shaft.



The Cutter Driving Mechanism



The Operating Side of a Redesigned Worm Milling Machine

The pieces which are finished by this machine are hollow cylinders which have been turned to the proper external diameter in a lathe. These turned worm blanks are forced on a mandrel, one end of which is inserted in the tapered draw chuck *A* having a hole 3 in. in diameter in the hollow spindle. The clamping of this mandrel is controlled by the lever *B*, and after the mandrel has been gripped by the chuck it is not released until the worm is entirely finished. The tooth clutch *C* connected to the indexing worm and wormwheel controls the adjustment to and the division for the successive leads, which in this case are 1 to 6 inclusive. The index box *E* contains all of the required gear combinations for the range of leads available irrespective of whether the threads are right or left hand. This arrangement does away with the necessity of removing the gears to give changes in the lead, the combinations being controlled by the latch levers *F*

Another View of the Machine Showing Pitch Change Gears and the Spindle Head Rotating Worm Shaft

through sliding sleeves. The pitches, which range from ¼ to 9¾ in., are obtained through the change gears *J*.

The feed change gearbox *H* provides nine changes without removal of the gears. These gears are mounted on sliding sleeves, as was the case with the gearbox for varying the leads, and are controlled by the levers *I*. The motion for the lead gearbox is transmitted from the feed change box. This motion is also carried through the lead index box and connects with the rotating mechanism and also with the pitch change gears *J* for connection with the table feed screw. Engagement of the feed clutch is controlled by the lever *K*, while the reversing fast power table clutch is controlled by the lever *L*.

The cutter head is adjusted to the required depth through the screw *O*, which is equipped with a micrometer measuring collar. After the cutter has been adjusted the head *N* is locked in place by the lever *M*, which actuates an eccentric clamp. With the exception of the spindle head rotating worm shaft *P*, all of the levers controlling the various adjustments of the machine are available from the front. An adjustable circular gage is provided for the worm shaft *P* to give fractional degrees of angularity to the cutter spindle within a maximum range of 40 deg. on each side of the horizontal. The cutters are located with the axis by the use of spacing collars. The clutch giving feeds and rotation for the left and right hand worms is controlled by the latch lever *R*.

The machine is belt driven, the power being transmitted from the pulley *S* through the reduction gears in the box *T* to the spur gear *U*. From here it is transmitted through bevel gears and finally through a hardened pinion and gear to a hardened helical gear made integral with the spindle which has a taper bearing on each end. The thrust of the spindle produced during the cutting operation is taken by the oil-immersed bearing *V*. The motion for the feed is originally derived from the gear *W* and passes on to the front of the machine.

The base of the machine *X* serves as a reservoir for the cutting lubricant, which is forced upon the cutter and the work by a pump and suitable piping.

The maximum distance between the end of the spindle and the center is 24 in. and the spindle is 8¼ in. above the table, which is 14½ in. wide. The over-all size of the base is 54 x 99 in.

Aluminum Solder

Bruce & Cook, 190 Water Street, New York, are receiving reports of unusual success attained with an aluminum solder which they handle, the special feature of which is that it requires no flux and will follow an ordinary soldering copper. The search for a satisfactory aluminum solder is something to which a great deal of effort has been given, most of it unsuccessfully. The new solder contains no aluminum. For that metal there is substituted another which lowers the melting temperature. In using the solder to join aluminum, practically the ordinary method is followed except that no flux is used, the soldering copper and parts to be joined merely being tinned. Brass and bronze may be joined to aluminum, but in this process the usual acid flux must be used.

New rates on cast-iron pipe in carloads from Charlotte, N. C., to Pacific coast terminals, recently suspended until June 13, 1916, have been canceled by the Interstate Commerce Commission, but the carriers have been authorized to establish a rate which shall not exceed that from Chattanooga, Tenn., or Birmingham, Ala., by more than 5c. per 100 lb. Soil or sanitary pipe is made at Charlotte but no water or gas pipe.

COKE IN THE BLAST FURNACE

Gruner Ideal Not a Goal—Low Coke Means Low Wind—Coal Quality Desired

The coke consumption of blast furnaces is discussed at some length in the March *Journal* of the American Institute of Mining Engineers by Henry Phelps Howland, superintendent of blast furnaces, Wisconsin Steel Company, South Chicago, Ill. His paper has mainly to do with the question of the gasification of the carbon at the tuyeres of the furnace; and his contention is that none of the furnaces which he has investigated, and he gives a list of records of 26 furnaces, which he regards as representative of American blast-furnace practice using Mesaba ores, is working according to the basis commonly called Gruner's ideal. The Gruner ideal is that all the carbon burned in the furnace should be first oxidized at the tuyeres to carbon monoxide and that all reduction of oxides above the tuyeres should be caused by carbon monoxide which thus becomes carbon dioxide. Mr. Howland argues that there is no reason why the Gruner condition should be desired.

He also emphasizes that the actual volume of blast per pound of coke is practically a constant, and that this fact should tend to show the value of low wind in seeking primarily a low coke consumption. He makes an analysis of conditions when operating Wisconsin Furnace No. 1 with direct reduction of the ore by the carbon, with indirect reduction by carbon monoxide and with the indirect reduction under the Gruner ideal. As a result he holds that the operation of the furnace could not have been improved by endeavoring to maintain it along the Gruner ideal, even assuming this to be a possibility. Not only does he believe that the best furnaces of the day are persistently violating Gruner's ideal, but the way that lowest coke records are now obtained is by doing a good deal of direct reduction of the ore. It seems clear to him that in furnaces having a low coke consumption one of the most important, if not the most important, function of the carbon burned at the tuyeres is to produce heat to allow the carrying on of the direct reduction rather than to produce carbon monoxide for indirect reduction.

The most desirable thing about a coke in his opinion is a quality in the carbon which will allow of its being instantaneously burned to carbon monoxide and thus obtaining maximum concentration of the heat where needed. He adds that practically all of the 26 furnaces, of which he gives operating particulars, that use less than 1700 lb. of coke per ton of iron, used a coke made either wholly or largely from low-ash high-volatile coal. "While the carbon content is high," he adds, "it evidently is not the quantity but the quality of the carbon that produces the low coke consumption." In conclusion, he said:

> The low coke consumption goes hand in hand with low wind. The lower volume of gas resulting means, in a hearth of a given area, a lower velocity of the gases, thus tending toward concentration of heat.
>
> Following the same line of reasoning, we see the value of our big hearth areas and steep bosh angles, both of which tend to decrease the velocity of the gases and concentrate the heat where we need it.
>
> The low wind and large hearths are comparatively easy of obtainment. The great problem will be to operate our coke ovens in such a manner as to obtain coke from inferior coal, the quality of whose carbon shall approach that of the carbon in the coke made from better coals. Judging from the advancement made in by-product oven operation during the last 10 years, we have every reason to anticipate the correct solution of this problem.

The Standard Scale & Supply Company has removed from 243 and 245 Water Street to 1631 Liberty Avenue, Pittsburgh, where it will occupy a building which affords better facilities. The new location is near the freight stations of all the railroads entering the city. The New York office of the company has been removed from 136 West Broadway to 145 Chambers Street. Its products are scales, trucks, concrete mixers and general contractors' equipment.

Equipment of an Electroplating Room

The heating and ventilating of the acid-dipping, electroplating and japanning plant of the General Electric Company and the mechanical and electrical equipment used to carry on the work was described in a recent number of the *General Electric Review*. The plant forms a part of the switchboard department of the company at Schenectady, N. Y., and is housed in a one-story brick structure divided into three rooms, one for acid-dipping, one for electroplating and the other for japanning and enameling. The floors are of concrete and in the dipping and plating rooms are treated with asphalt and granite dust to make them acid proof. Drains connected with the sewer are provided to keep the floors dry.

THE VENTILATING SCHEME

The direct-indirect system of heating is used, air entering the building through several openings near the ground line and passing up through steam radiators located against the wall and above the air entrances. A 35-hp. motor-driven fan removes the vitiated air through a system of hoods, flues and ducts, and over the dipping tank and the cleaning tank in the electroplating room specially designed hoods extend out from the wall at an angle of approximately 60 deg. Gases, fumes and steam from the tanks, together with air from the room, are drawn up into the hoods through slots 12 in. long and ranging from 1¼ to 1¾ in. in width. The hoods are divided into six sections, corresponding to the six sections of the tanks and each section of the hoods has five slots or vents. A system of slides in the flues may shut off any section of the hood from the main duct. The combined volume of the two rooms is 51,100 cu. ft., and the ventilating system is designed to make a change of air once every 90 sec.

The painting and baking room is heated by radiation from steam pipes and is ventilated by tilting-sash windows in the cupola.

SPIRAL CONVEYOR PLATING MACHINES

Instead of obtaining the desired voltage in the plating room by rheostats mounted at each tank, sets of contactors mounted on pipe frame work suspended from the ceiling are employed, a single set being provided for each tank. This arrangement, which is controlled by push-button switches, gives a variation equivalent to a dial rheostat of 36 contact points. Two spiral conveyors extend the length of the tank above the solution. The conveyors are connected at the farther end by a U-shaped rod over which rotates a disk with fingers that slide on the rod. The work to be plated in this machine is hung on the lower end of S-shaped hooks, while the upper end is hung on the continuous groove of the conveyor. As the conveyor revolves the hooks advance along the groove and draw the work through the plating solution, and at the end of the first conveyor the hooks are mechanically transferred to the beginning of the second one, being pushed along the rod by the fingers on the rotating disk. The work thus moved through an arc of 180 deg. is then caught by the thread of the second conveyor and in time is returned to the starting end of the tank. The plating arrangement is thus a continuous one.

THE JAPANNING OVEN

The oven used in the japanning room consists of a square brick room open on one end and lined with insulating brick covered on the exposed surface with silicate of soda. In the oven is a motor-driven turntable on which is built a steel cylinder 10 ft. in diameter and 9 ft. high, containing two compartments with openings corresponding to that in the brick wall. In the space between the brick wall and the steel cylinder are located electric heaters to bring the temperature of the oven to 500 deg. Fahr. After one section of the cylinder is loaded, the turntable is revolved through 180 deg., which brings the loaded compartment in the baking position and the other one in the position for loading or unloading. If, on the other hand, the turntable is rotated only 90 deg., both compartments will be in the baking zone.

A wire mesh gate is provided which must be lowered before the driving motor circuit can be completed. This arrangement is relied upon to prevent motion of the turntable when the gate is up but permits the table to be revolved at the proper time without danger of accident to the operator or others. Two vertical doors or flaps along the edges of the oven opening, which press against the revolving cylinder and close the zone between the oven and the cylinder to the outer air, are used to conserve the heat. When the cylinder is revolving the flaps are drawn to one side automatically. An automatic time switch enables the current to be shut off from the heating resistances at a predetermined time and to be turned on again when desired.

Fewer Accidents at Steel Works

WASHINGTON, D. C., March 13, 1916.—An interesting series of charts representing studies made by the Bureau of Labor in the accident experience of the iron and steel industry formed a feature of the Safety First Exhibit of the United States Government at the New National Museum, which was held here early in the month. These charts present probably the most exact demonstration of the value of safety effort that has yet been offered and in view of their importance they will be reproduced in an official report for general distribution.

Four of these charts form an unusual group, illustrating the effects of safety organization. One shows for a large plant a reduction in accident frequency of from 370 cases per thousand employees in 1905 to 115 cases in 1913, as the result of the introduction of safety methods. A second chart shows how this reduction was distributed among the departments. Accidents in blast furnaces, for example, declined from 429 to 132; those in steel works from 364 to 196 and those in the mechanical department from 387 to 65. A third chart shows for another large plant 323 accidents in 1907, but only 88 in 1913. The fourth chart contrasts a poorly organized plant in 1910 with one well organized. This constitutes a very striking comparison, showing 530 accidents per thousand employees under poor organization as compared with 134 under good organization.

A group of charts is devoted to the causes and nature of injury of which the most interesting, probably, is that showing the relative frequency and severity of the accidents from different causes. For example, falling and flying objects are charged with 27 per cent of the cases, but caused only 23 per cent of the loss; on the other hand, cranes and hoists are debited with 9 per cent of the causes, but 13 per cent of the loss. Locomotives and cars caused 4 per cent of the accidents but 9 per cent of the loss. These charts indicate very clearly how imperfect an index of importance the frequency rates are, considered independently of the item of time lost because of the accidents.

A chart covering a series of years develops the interesting fact that workmen who were unable to speak English had a materially higher accident rate than those familiar with the language. Other charts give interesting and valuable information as to the extent to which rates of accidents at night are in excess of those for the day.

The exhibit as a whole showed marked progress in accident reduction and pointed to the weak places which need still further study. W. L. C.

The Manufacturers' Association of Seattle, Wash., during an investigation recently conducted for the purpose of determining the output of mining machinery and equipment by local concerns, with special reference to the Alaska trade from that point, learned that 97 establishments are now so engaged. The association's figures show that over 99 per cent of the entire trade between Alaska and United States passes through or originates in Seattle. Statistics show an increase of approximately 236 per cent in machine-shop products from 1904 to 1909.

SILICON ALLOY STEELS*

Their Properties and Uses—Silico-Manganese and Low Hysteresis Metal

Although silicon is an ingredient of practically all steels its presence is often accidental or unavoidable, and if it is added to simple structural and tool steels the purpose is to promote soundness rather than to improve the properties of the finished steel. In tool steels silicon is always present, and in times past high-silicon steels have been advocated for tools, but they are not now so used in a commercial way.

PROCESS OF MANUFACTURE

Silicon steels are generally made in the open-hearth furnace, preferably on an acid hearth, as the acid slag does not waste the silicon in the final additions as rapidly as does a basic slag that contains free oxide of iron, and therefore the final content of silicon desired may be more closely controlled.

Silicon in true silicon steels must be added to the charge only a short time before teeming, as any oxygen that reaches the metal will largely be taken up by the silicon which will be wasted by burning to silicic acid (SiO_2). When so added to a bath in proper condition as to temperature and amount of dissolved oxygen or oxides, the silicon will overwhelm the gases in solution, and the steel as cast will be free from blowholes and with a maximum tendency to pipe.

Table of the Composition and Properties of Structural Silicon ("Silico-Manganese") Steels

Sample No.	Description	Carbon, per Cent	Silicon, per Cent	Manganese, per Cent	Sulphur, per Cent	Phosphorus, per Cent	Tensile Strength, Lb. per Sq. In.	Elastic Limit, Lb. per Sq. In.	Elongation, per Cent	Contraction of Area, per Cent	Ball Hardness
1	Automobile springs	0.50	2.0	0.70	0.04	0.03	.....	.....	..	....	..
2	Springs treated	0.47	1.83	0.70	0.01	0.01	254,000	230,000	9	40	..
3	Carriage axles	0.50	1.90	0.70	0.04	0.04	.....	.....	..	....	..
4	Test piece, natural condition	0.48	1.4	0.45	..	..	113,760	71,100	17	.....	..
5	Test piece, treated	0.48	1.4	0.45	..	.....	177,750	149,310	14	.....	..
6	Test, treated	0.50	1.75	0.65	.....	.....	.....	198,700	8.5	21	418
7	Annealed	0.36	1.27	0.57	0.03	0.02	94,500	59,750	25	48	..
8	Drawn at 427° C.	0.36	1.27	0.57	0.03	0.02	182,200	160,850	12.5	34	..
9	Drawn at 427° C.	0.31	2.39	0.48	0.03	0.05	134,750	104,700	22	55	..

Because of the large proportion of silicon in silicon steels and because of the short time allowable after the silicon has been added to the bath it should be added in the heated or molten state. Silicon steels containing about 2 per cent of silicon or more roll very "dry," that is, they are liable to be cracked by the heavy reductions of the first passages through the blooming mill.

PROPERTIES AND USES OF SILICON STEEL

Silicon steel containing 0.20 per cent of carbon may be rolled if the silicon content is less than 7 per cent. With 0.90 per cent carbon it may be rolled if the silicon is less than 5 per cent. With a silicon content higher than 5 per cent the metal is useless. In structural steels the effect of the silicon is to raise the elastic limit to a moderate degree. Silicon lowers the coeffcient of expansion of steel somewhat as nickel does.

The treated test piece comprising sample 5 in the table was heated to 950 deg. C. (1750 deg. Fahr.), quenched in water, and drawn at 427 deg. C. (800 deg. Fahr.). The hardening temperature of samples 8 and 9 was probably about the same as that of sample 5.

The dividing line between silicon-treated steels and silicon-alloy steels is not clearly defined but the latter was used for several important purposes. In structural lines their employment is limited, as their properties can, generally speaking, be readily equaled or excelled by simple steels.

The chief structural use of silicon-alloy steel is in springs of the leaf type for automobiles and other vehicles. The silicon is considered to make the springs somewhat tougher so that they are less liable to break in service than springs of simple steel. In the trade this steel is called silico-manganese steel, though its content of manganese is usually no more than is common in simple steels and not enough to properly cause the steel to be classified as a manganese-alloy steel.

In electricity, an important use for silicon-alloy steel is in the cores of static transformers. With the exception of manganese most of the elements employed in making alloy steels, although not greatly decreasing the magnetic susceptibility of the iron that contains them, lower its hysteresis loss. Silicon is the element most used for that purpose because it is the cheapest, but aluminum, phosphorus, nickel (3.50 per cent) and tungsten have a similar effect.

The silicon content in silicon transformer metal is usually between 3.50 and 4.50 per cent, or, more exactly, 4 to 4.25 per cent. Some 25,000 tons was used in 1913 for this purpose. The steel is rolled into thin sheets which, for one large user, are 0.014 in. thick.; the transformer cores are built up of these sheets, which are cut to shape separately by stamping. For low induction the permeability of this steel is nearly as great, if not greater, than that of any other variety of iron or iron alloy known, and its hysteresis loss is less than that of any other or nearly as low cost.

The results of an analysis of a transformer core made of silicon-alloy steel are as follows: Carbon, 0.08 per cent; silicon, 4.18 per cent; manganese, 0.11 per cent; sulphur, 0.06 per cent; phosphorus, 0.01 per cent, and aluminum, 0.01 per cent.

Silicon steels cannot be case hardened, as the silicon retards the absorption of carbon; the silicon content must therefore be low, not over 0.04 per cent, in steel intended to be so treated.

*Extract from a Bulletin on the "Manufacture and Uses of Alloy Steels" prepared for the U. S. Bureau of Mines by Henry D. Hibbard, consulting metallurgist.

Tungsten-Molybdenum Alloys as Substitutes for Platinum

Because of the high cost of platinum, any substitute commands attention owing to the wide use and importance of this element. Frank A. Fahrenwald, of Cleveland, Ohio, presented a paper at the February meeting in New York of the American Institute of Mining Engineers entitled "A Development of Practical Substitutes for Platinum and Its Alloys, with Special Reference to Alloys of Tungsten and Molybdenum," which has created a wide interest, surprising even to the author himself, especially from a commercial standpoint. An idea of the scope of the work may be had from the following:

The experimental work resolved itself into three parts, each being marked by a different method of attack, necessitated by limitations encountered as the work progressed under previously adopted methods.

The first part consisted of experiments on binary combinations of those of the metals which it was feasible to consider, and the melting points of which lay within the limits of ordinary fusion methods. The results of these experiments, performed as indicated therein, lead to the conclusion that metals or alloys of metals outside of the precious-metal groups, are unsuitable as substitutes for platinum. The gold and silver alloys of palladium have been found to be excellent substitutes for platinum in its softer forms, and while not so chemically resistant, fill all requirements where conditions are not too rigid.

The second part develops the fact that except in two respects, pure ductile tungsten, and, to a lesser degree, molybdenum, meet all of the specifications of a practical substitute for platinum and its alloys. These two defects are its ease of oxidation, and the difficulty with which it can be soldered; and they have been overcome by coating with a precious metal or alloy, the resulting material being in many ways far superior to platinum or its alloys. This material has met with instant demand, is in many cases replacing the best platinum-iridium alloys, and permits the performance of work which has been impossible with the materials hitherto available.

The third part describes the theoretical and practical considerations involved in the manufacture of

wrought tungsten and molybdenum, and gives results of the proper application of a similar method in the laboratory production of their alloys.

Wrought tungsten and molybdenum were produced on a laboratory scale, but no success attended the attempted production of alloys of tungsten with gold and palladium; while on the other hand, the alloys of the tungsten-molybdenum series were produced in wrought form. These operations were governed entirely by metallographic control, and their success suggests the possible application of a similar method in a treatment of such metals as iridium, tantalum, rhodium, osmium, etc., in combination with each other, or with tungsten or molybdenum, which may result in the production of alloys possessing properties far superior to those of any material now available.

SERIOUS FREIGHT SITUATION

Shippers Urged to Act in View of Worse Shortage Threatened

The shippers of the country are facing a railroad situation of unparalleled seriousness. Congestion of delivery facilities along the seaboard has grown worse and has backed up along trunk lines as far west as Chicago. A widespread car shortage already exists. Inability to ship raw materials from producer to consumer is beginning to threaten the continuance of operations at a number of plants. Traffic experts declare that exaggeration of the impending troubles is impossible and that transportation facilities are rapidly freezing up. The Interstate Commerce Commission is this week holding a conference in an effort to set in motion remedial activity. The charging of higher demurrage rates is proposed. The American Railway Association has made a ruling intended to effect the return of 20 per cent more cars from Eastern roads to Western roads than are received. Thousands of Western cars are at the present time indefinitely tied up or lost between Chicago and the seaboard. Conditions instead of tending toward relief grow progressively worse. Every shipper should facilitate the movement of cars at his own plant.

Danger also threatens from another direction. New demands from their employees confront the railroads and a general tie-up is a possibility. So grave are these impending differences that already resolutions have been generally circulated by the Chicago Association of Commerce. These point out that arbitration must be the ultimate means of settlement. The problem is how to bring home to both parties a realization of their obligation to arbitrate at a time when hoped-for advantage in dictating terms of settlement may lead to a contest in endurance. One thing at least is possible, the utter condemnation of such a strike before the court of public opinion. To the end that such opinion may become widely manifested the circulation of the Chicago resolutions is urged. They are as follows:

Whereas, certain grave differences are impending between the railroads of the United States and their train service employees which if not adjusted threaten to result in a serious interruption of railroad transportation; and

Whereas, arbitrary action on the part of either side without these disputed questions arising from the demands of both sides being submitted to a careful and impartial investigation would be inimical to the public; and

Whereas, a railroad strike even temporarily interfering with traffic operations throughout the country would be a national calamity entailing a loss upon the public far greater than the loss to the parties to the controversy; therefore, be it

Resolved, That it is the sense of The Chicago Association of Commerce, if the parties to the controversy do not reach an agreement through direct negotiation, they should submit their differences to an impartial board of arbitration for the adjustment of all causes of difference between them, with due regard to the interests of the public.

The West Leechburg Steel Company, Pittsburgh, maker of strip steel, has removed its Chicago office from the City Hall Square Building to 957 Peoples Gas Building.

TO HELP FREIGHT CAR SUPPLY

Suggestions by an Important Railroad System How Patrons and Carriers Can Co-operate

The Queens & Crescent Route, Cincinnati, Ohio, in circular No. 20, issued by the general superintendent of transportation, gives the following helpful suggestions under the title of "Car Supply Co-operation—Efficiency:"

Nothing is more effective in advancing prosperity than good transportation facilities and adequate freight car supply. The transportation facilities of the country are good and the car supply, if effectively handled, is sufficient. The indications are that a severe car shortage will prevail in the near future unless strenuous and united efforts are made by railroads and their patrons to reduce standing time of freight car equipment by quicker loading and unloading of cars. When cars are plentiful the necessity is not so urgent, but when business increases and the available supply of cars is reduced, the shippers and carriers have it in their power to increase materially the supply of equipment by hearty co-operation and efficient methods.

The average time required for loading a car by shipper is about two days and unloading it by consignee about two days, or a total of four days. If this could be reduced to three days a material gain in available equipment is made, resulting in shippers being able to market additional business to that extent. The reduction in standing time results in fewer cars standing in yards or on private tracks, materially reducing the possibility of congestions which are expensive to shippers and receivers as well as to the railroads.

HOW SHIPPERS AND RECEIVERS CAN ASSIST

Some of the ways in which shippers and receivers can materially assist in this vitally important matter are:

1. By not ordering more cars than are actually needed.
2. By loading cars as quickly as possible to full capacity and furnishing billing promptly, so there will be no delay in starting the car to its destination.
3. By loading car properly so that it will not be necessary to delay it in transit adjusting the load or transferring it to another car.
4. By loading or unloading cars as soon as placed, regardless of free time allowance.
5. By notifying carrier as soon as cars are loaded or made empty and ready to remove.
6. By not using a box car when a gondola or flat car will serve, as box cars are usually in greater demand.
7. By endeavoring to have reconsigning orders placed in advance of arrival of car so it may be switched to proper track on arrival instead of being placed on a yard track awaiting disposition.

HOW CARRIERS CAN HELP

Some of the ways in which the carrier can help are:

1. By placing cars for loading or unloading promptly and moving them as soon as loaded or unloaded.
2. By avoiding all possible delay to loaded or empty cars; a car has a daily earning value and each hour's delay means so much loss to the carrier as well as a loss to the shipper who has a commodity for sale but cannot market it for lack of equipment.
3. By seeing that consignees are notified at the earliest possible moment of arrival of freight so it may be unloaded promptly.
4. By seeing that proper billing is promptly and properly made to avoid holding car for billing at some junction point.
5. By prompt handling of cars in bad order so repairs may be made quickly.

Finally: The shippers and the carrier can materially advance their interests by hearty co-operation in this important matter, and in the present car shortage it is hoped that each will give his assistance in the effort to improve the situation.

WORCESTER METAL TRADES

Annual Meeting and Banquet—Jerome R. George President for Coming Year

The annual meeting of the Worcester Branch, National Metal Trades Association, held at Worcester, Mass., March 10, was marked by three things: A unanimity of opinion as to policies for the coming year, a solidarity of purpose to maintain and increase the influence of the organization, and two addresses such as are rarely heard by a business body.

The officers elected for the year were: President, Jerome R. George, Morgan Construction Company, Worcester; vice-president, Herbert E. Jennison, Blake Pump & Condenser Company, Fitchburg; treasurer, Arthur W. Beaman, Stockbridge Machine Company, Worcester. John W. Higgins, retiring president, was elected an honorary member. Members of the executive board elected for two years were: George I. Alden, Norton Grinding Company; A. E. Newton, Reed-Prentice Company; A. J. Gifford, Leland-Gifford Company; Edwin C. Harrington, Harrington & Richardson Arms Company.

At the banquet, President Higgins reviewed the work of the past year and Mayor George M. Wright extended the greetings of the city. Ralph D. Redfern, field secretary of the Associated Industries of Massachusetts, spoke briefly of the work he is doing.

John N. Cole, chairman of the Boston Development Board, spoke forcefully on restrictive legislation. He gave startling figures, compiled by research of the Development Board, which emphasized the rapid change in industrial conditions in Massachusetts since 1909, and drew from them a lesson of legislative failure. He pointed out the rapidly lessening growth of leading industries of the State relative to the growth in other sections of the country. None of his assertions were more convincing than those in which he pointed out the relative burden of taxation and marked decrease in savings bank deposits per capita. The relation between legislation and changing industrial position of the State was clearly drawn.

James A. Emery, counsel for the National Association of Manufacturers, took for his subject "Industrial Preparedness." He said in part:

"The nations lately in conflict will not sit idly by and permit us to possess the trade we have acquired, much less our domestic market, without a competitive struggle made the more desperate by their own economic necessities. Foreign trade is as essential to the national life of Europe as daily toil to the manual laborer. Trade supremacy lay at the very root of the European struggle, for thickly populated nations must market their surplus production or their surplus population cannot be employed.

"It must be apparent that, with the end of the war, we face no longer an imperative demand for a huge volume of exports, but the commercial challenge of desperate nations driven by economic necessity to recover their lost trade, armed with the industrial experience which manufacture for self-defense has brought to each belligerent power, and disciplined in self-sacrifice and ordered efficiency in the sternest of all schools —war. With peace, our problem, then, is not only how may we hold the foreign trade we have acquired and which, by its nature is not dependent on war, but how may we keep intact our domestic market, the most tempting trade prize the world will hold.

"High wages and low labor cost can go hand in hand, but high wages and low efficiency cannot. Our greatest industrial need in this hour is skill and efficiency. We must make the best operatives while making the best commodities. The world contest of peace succeeding that of war will be fought with trained men in shops and commerce, as the present war was fought by trained men, who, to win, must have behind them superior capacity in shop and office."

The Benjamin Iron & Steel Company, Hazleton, Pa., will produce steel castings by either the convertor or electric furnace process, having already decided to install a cupola of 10 tons capacity.

Oxygen Enrichment of Blast

An interesting discussion on the enrichment of the air for blast furnaces by Dr. H. Blome, of Rombach, in Lorraine, has appeared in *Stahl und Eisen*. The subject is of importance because of the great advance in the methods of producing oxygen. Practical tests carried out at Ougrée Marihaye, where the oxygen percentage was raised to 23 per cent by volume, showed an increased output of 12 per cent and a very hot working furnace, although the coke consumption was lowered considerably. So far, however, there is no information that the process has been commercially successful or has been used in continuous operation. The writer then considers under what conditions enriching the blast with oxygen can bring about commercial profit.

An enriched blast will affect the furnace operation in different ways. There will be a decrease in the amount of nitrogen entering the furnace, but with a furnace working with low top temperatures the lowering of the volume of nitrogen has no importance. With a Minette ore the nitrogen carries from the furnace only 1.5 per cent of the total heat generated, and as only a fraction of the nitrogen is affected, it is seen that even for furnaces with high top temperatures there will be no essential saving in coke.

There will also be a greater concentration of carbon monoxide, a decrease in the velocity of the gas, more complete combustion of the carbon in the coke in a smaller space and consequently higher temperatures. Improvements can only be brought about by an increase in the indirect reduction through the greater percentage of carbon monoxide in the gases, the longer time the gases are in contact with the charge, and also by greater output which will decrease the loss of heat per ton of pig iron by radiation.

By careful calculation it is shown that each addition of oxygen to the blast brings about conditions more favorable to the hearth but less favorable to the shaft. Also oxygen enrichment should only be carried out if the furnace is working with excess of heat in the shaft, that is, with high top temperatures. If the ore is one that allows an increase in the indirect reduction, then a lowering of the top temperature is brought about, the carbon used up to that point for direct reduction is saved, there is smaller gas consumption in the stoves and smaller power requirements for furnishing the blast.

The use of oxygen enrichment should be of general application for the avoidance or removal of operating difficulties, which often arise from scaffolds or growths suddenly dropping to the hearth, and bringing about a drop in temperature. Calculations are made on an extreme case which show that if pure oxygen could be supplied it would be needed for two hours. It is often the case that due to the descending of smaller growths and scaffolds a colder working furnace is caused, giving rise to the charging of more coke, although the shaft has an excess of heat. Before the extra coke reaches the hearth the trouble is therefore often removed. For such cases the use of an enriched blast would prevent the making of the bad iron that would otherwise occur, and there would be absolutely no need for extra coke additions. G. B. W.

The World's Salesmanship Congress, to be held in Detroit, July 9 to 13, is confidently expected to be the largest convention of salesmen, sales managers, business executives and commercial travelers ever held in one city. The program committee, under the direction of Hugh Chalmers, president Chalmers Motor Company, chairman, and Harry W. Ford, president Saxon Motor Company, vice-chairman, is already obtaining the principal speakers for the several events of the convention. It is understood that some of the foremost industrial and mercantile men of America, England and Canada have signified their willingness to attend and speak to the salesmen on the branch of business of which they are the recognized leaders. The general secretary is Walter C. Cole, Detroit Board of Commerce Building, Detroit, Mich.

Massachusetts Foundry Code

The Massachusetts State Board of Labor and Industries is conducting hearings on a tentative draft of rules and regulations relating to safe and sanitary working conditions in foundries and the employment of women in core rooms. The first hearing was held in Springfield, March 3; the second in Worcester, March 9, and the third will be held at the State House, Boston, Thursday evening, March 16.

At the Worcester meeting the discussion was confined to the tentative draft as presented by the board. This resembles in its main features the rules now in force in New York and Pennsylvania. It was drawn up by a committee of eight men, four representing the employers and four the International Molders' Union. The employers were represented by Walter C. Fish, General Electric Company, Lynn; R. D. Reed, H. B. Smith Company, Westfield; Frank Williams, Crompton-Knowles Loom Works, Worcester, and Richard E. Warner, Taunton. The Molders' Union was represented by John R. O'Leary, Worcester; Eugene L. Murphy, Norwood; James A. Loveday, Pittsfield, and William John, Boston. At Worcester the employers seemed to feel that the tentative draft would need considerable changing before it would be satisfactory to all parties.

A committee "representing foundry managers in the State of Massachusetts" has submitted to the State Board another set of regulations which is expected to find many supporters at the Boston hearing. It was compiled by S. E. French, Athol Machine Company, Athol; E. B. Freeman, B. F. Sturtevant Company, Hyde Park; C. L. Newcomb, Deane Steam Pump Company, Holyoke; R. E. Warner, White-Warner Company, Taunton, and M. W. Alexander, General Electric Company, Lynn. One of the large manufacturers interested in the work of the second committee said to THE IRON AGE representative that the board is required by the laws of 1912 to issue rules regarding the employment of women in core shops. "It is possible," he added, "that interested parties have requested the board to issue a set of rules covering foundries in general, in which rules a section will be devoted to core shops employing women. As far as is known the latter condition is the only one that the board is required to rule upon.

"In January, 1916, the board issued in a preliminary manner a tentative draft of foundry rules. This is not favored by the manufacturers in its existing form and is not considered to be for the best interests of either employer or employee. Therefore, the manufacturers on January 20, 1916, appointed a committee to draft an alternative set of rules. A large majority of the foundries in the commonwealth have already given to the committee of manufacturers their signed endorsement of the proposed regulations issued by the committee, which fact should have considerable weight with the board when officially presented by the committee of manufacturers."

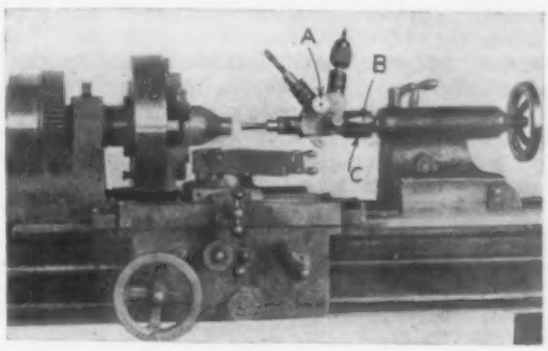
Pennsylvania Shipbuilding Company

Another shipbuilding plant is to be located on the Delaware River, according to the plans of the Pennsylvania Shipbuilding Company, recently organized for this purpose and starting with a contract for six 6000-ton tank steamers. The company has acquired land at Gloucester, N. J., with a frontage of 800 ft. on the river. Haakon E. Norbom is president; Charles H. Moyer, formerly of the George V. Cresson Company, Philadelphia, vice-president, and George S. Hoell, secretary and treasurer. Henry Lysholm, superintendent of the hull department of the New York Shipbuilding Company, is the general manager. The company has opened offices in the Land Title Building, Philadelphia. The ships contracted for are, it is understood, for Norwegian account.

The Sloss-Sheffield Steel & Iron Company reports for the quarter ended Feb. 29 net profits from operations of $539,337, from which deductions for interest, taxes and the preferred dividend for the quarter leave a surplus of $355,317.

Turret Head for Engine Lathes

For use in tool rooms and machine shops where the volume of work that might be handled on a screw machine is not sufficient to warrant its installation, Charles Eisler, 43 Dodd Street, Bloomfield, N. J., has designed a turret for engine lathes. It is emphasized



A Turret Head for an Engine Lathe Which Enables Ordinary Screw Machine Work to be Handled without Purchasing Additional Machinery

that the turret can be put in working position as quickly as an ordinary lathe center or chuck and can be adapted to lathes the same as a tool holder employing inserted cutters or a regular chuck. It is possible to turn the turret to any angle without causing the operator to bruise his knuckles when the clamping screw is tightened or loosened, as the three tools are in line and do not stick up, and the clamping handle is entirely exposed.

The head does not rotate as is usually the case with lathe turrets, but swings to cover the various settings of the tools, which are three in number. This was adopted as the experience of the inventor showed that with the exception of a complicated screw machine job more than 85 per cent of the work in tool rooms and machine shops can be handled with three settings. When it is desired to change the position of a tool the knurled knob *A* is pulled out, and as soon as the tool is in place the plunger will automatically locate it in the proper position. The clamping handle *B* is relied upon to keep the tool rigidly in place, and the turret is fastened on the tailstock spindle by the clamping screw *C*.

Among the work which the turret is designed to handle are drill jig and die bushings, screw studs, small nuts, boring, recessing holes of various kinds, etc. The turret may be turned to various positions and the use of a taper plug enables a single one to be used on a number of different lathes.

Metals Production Equipment Company

The Metals Production Equipment Company is now the name of the Quigley Furnace & Foundry Company, 105 West Fortieth Street, New York City. The company has recently added a brass rolling-mill department at the Springfield, Mass., works for the production of flat brass, and the stockholders at the last meeting decided to change the name of the company as indicated. W. S. Quigley remains as vice-president. The general foundry business will, of course, be continued, and powdered coal, gas and oil burning equipment, furnaces and core and mold drying ovens will remain a feature of the business.

The National Enameling & Stamping Company, in the year ended Dec. 31, 1915, earned a surplus of $467,980 after the preferred dividend had been paid in 1915, equal to 3 per cent on the common stock. From this $152,500 was set aside for the sinking fund, leaving a final surplus of $315,480, as compared with a deficit of $49,505 the year before. During the year $137,000 in bonds were retired, the amount remaining being $2,903,000.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

EMPLOYER'S LIABILITY FOR DOCTOR'S BILL.—Where a foundry employee was injured while at work through an explosion of molten metal, the employer cannot be held directly liable to the attending physician for services rendered by him to the injured man merely because it may have been customary in the particular locality for other employers to engage physicians to treat injured workmen. But such liability may be based upon tacit ratification by the employer's board of directors of the manager's act in employing a doctor to attend the injured employee. (Indiana Supreme Court, Newcomb vs. Indiana Die-Casting Development Company, 111 Northeastern Reporter, 16.)

INFRINGEMENT OF PATENTS.—If a device performs the same functions as a prior patented device, and substantially the same way, there is infringement, although a part may be strengthened in the later machine, or there may be a change in form or use of different material. (United States District Court, Southern District of Iowa, Daniel O'Donnell, Inc., vs. Riscal Mfg. Company, 228 Federal Reporter, 127.)

RIGHT TO COPYRIGHT CATALOG ILLUSTRATIONS.—Copyright of an illustrated catalog prevents another manufacturer from copying illustrations therefrom, but does not prevent him from making independent prints from original articles, although that may result in similar illustration. (United States District Court, Southern District of New York, J. H. White Mfg. Company vs. Shapiro, 227 Federal Reporter, 957.)

INJURY CAUSED BY CO-EMPLOYEE OF MACHINE OPERATOR.—An operator of a metal-working machine, who was injured through a co-employee setting a plunger in motion by accidentally striking the treadle of the machine in picking up material on the floor, without authority, cannot recover damages against the employer on the theory of negligence in failing to safeguard the treadle, since such an accident could not be foreseen as a consequence of failure to provide a guard for the treadle. (New York Court of Appeals, Basel vs. Ansonia Clock Company, 110 Northeastern Reporter, 767.)

RESPONSIBILITY OF SURETY OR GUARANTOR.—Defendant who guaranteed that a manufacturer's sales agent would perform his agency contract by taking notes from buyers indorsed by responsible persons was released from liability by the manufacturer's acceptance of unindorsed notes. (New York Supreme Court, Appellate Division, Adriance, Platt & Co. vs. Kelley, 156 New York Supplement, 1013.)

WAR CONDITIONS DO NOT EXCUSE BREACH OF CONTRACT.—Before the European war was declared, defendants, comprising a partnership doing business in Germany, entered into a contract in New York to deliver at New York or Boston 120 tons of Belgium H. H. antimony, in monthly installments, some of which extended beyond the date when war was declared. The contract included the following terms: "Cash against documents on arrival of vessel. No arrival, no sale." When sued for breach of the contract as to deliveries agreed to be made after the war was on, defendants pleaded that the source of supply in Belgium was cut off, and that the German law forbade defendants, as citizens of Germany, to have intercourse with Belgian industries, but it was not shown that the antimony contracted for could not have been obtained at some port where shipment could have been made. Under these circumstances it is held by the trial term of the New York Supreme Court, in the case of Richards & Co. vs. Wreschner, 156 New York Supplement, 1054, that no excuse for non-performance was established and hence that plaintiff buyer is entitled to judgment for damages sustained through the breach. The court says: "It is well settled that impossibility due to a foreign law is no excuse. Contracting parties are subject to the contingencies of changes in their own law and liable to have the execution of their contracts prevented thereby; but it is on the ground of illegality, not of impossibility. Prevention by the law of a foreign country is not usually deemed an excuse, when the act which was contemplated by the contract was valid in view of the law of the place where it was made and for stronger reasons when it was also then valid at the place of performance. . . . The contract was entered into in New York and was to be performed in this country, and the nature, validity, obligation and legal effect of the contract must be determined by the law of the place of contract, and effect will not be given to foreign laws in derogation of the contracts or prejudicial to the rights of citizens."

EMPLOYER'S DUTY TO INSPECT MACHINERY.—The fact that an employer has purchased machinery or appliances from a reputable manufacturer does not exonerate him from duty to make such tests and inspection as are reasonably necessary to assure that the machinery or appliances are safe for use by workmen. (Oklahoma Supreme Court, Davis vs. Missouri, Oklahoma & Gulf Railway Company, 154 Pacific Reporter, 503.)

PERFORMANCE OF CONTRACT TO INSTALL PUMP.—Under a contract for installation of a pump, the seller agreeing to furnish plans for the foundation to be constructed by the buyer, the buyer's failure to construct the foundation did not excuse the seller's failure to make the installation, if the seller merely furnished a rough pencil sketch for the foundation not showing dimensions for connections between the machinery and the foundation. (Washington Supreme Court, United Iron Works vs. Wagner, 154 Pacific Reporter, 460.)

INJURY CAUSED BY DEFECTIVE WIRE ROPE.—In a suit for injury to a craneman caused by the breaking of a wire rope in lifting a heavy load, the jury was warranted in finding that he did not assume the risk, although he knew such wires were short-lived, where he had been assured by his foreman of the safety of the wire in question and other employees were charged with the duty of inspecting it. (United States Circuit Court of Appeals, Third District, Matzok vs. American Car & Foundry Company, 228 Federal Reporter, 179.)

PROVING INJURY TO SHIPMENT IN TRANSIT.—Although proof that an article was in sound condition when shipped and arrived in a damaged condition raises a presumption of negligence on the part of the carrying railroad company, liability of the latter for injury to a boiler was not shown by proof that after being unloaded from a car, hauled on a dray and installed in a basement, it was found to have been cracked, in the absence of convincing proof that the cracking did not occur while the boiler was being unloaded, hauled by dray or in being installed. (Minnesota Supreme Court, Lewer vs. Minneapolis & St. Louis Railroad Company, 156 Northwestern Reporter, 6.)

RIGHTS OF NON-RESIDENT CORPORATIONS.—A Pennsylvania machinery corporation not licensed to do business in Wisconsin cannot maintain suit in the latter State on a contract made there, unless the transaction was one of interstate commerce. (Wisconsin Supreme Court, Sprout, Waldron & Co. vs. Amery Mercantile Company, 156 Northwestern Reporter, 158.)

BINDING EFFECT OF WRITTEN PROPOSAL.—A proposal to furnish apparatus, written on plaintiff's office stationery, was not affected by a clause printed at the bottom of the first page, in small type, to the effect that all contracts were subject to approval at plaintiff's home office. (New York Court of Appeals, B. F. Sturtevant Company vs. Fireproof Film Company, 110 Northeastern Reporter, 440.)

CONCEALMENT OF INSOLVENCY BY BUYER.—A seller of goods on credit is entitled to rescind the sale on discovering that the buyer was in failing circumstances when the order was given and had no reasonable expectation of being able to pay the agreed price, if the seller was ignorant of such condition at the time the contract of sale was made. (Alabama Court of Appeals, Ladd vs. Parker-Blake Company, 70 Southern Reporter, 188.) But rescission of the contract by the seller, under a provision of an accepted order to the effect that information affecting unfavorably the credit of the buyer shall give the seller right to cancel after acceptance, must be exercised within a reasonable time after such information is obtained. (North Carolina Supreme Court, Davidson Hardware Company vs. Delker Brothers Buggy Company, 86 Southeastern Reporter, 958.)

OWNERSHIP OF PATENTS

Factors Determining Rights of Employers and Employees

BY GEORGE HILLARD BENJAMIN*

Any person who has made a new and useful invention may obtain a patent, and the patent when issued belongs to the patentee, or, where there are several patentees, to all of them, each patentee having exactly the same right.

A patent grants three distinct rights: The right to make, the right to use and the right to vend. The patentee or each of the patentees individually may assign his right to make, the right to use, the right to vend, or all of these rights. The patentee or patentees may grant licenses of the right to make, the right to use, the right to vend. The rights conveyed may be exclusive or they may be accompanied by restrictions. That is, the right to make may be conveyed with a restriction that the invention be made at a certain place, of a certain size, of certain material, etc.; the right to use, with the restriction that the invention be used at a certain place, to a certain extent or for a certain purpose; the right to vend, with the restriction that the invention may be sold at a certain place, in certain localities, at a certain price. The purchaser of a patent or the licensee under a patent obtains only such rights as are directly transferred, and is limited in his right to make, to use or to vend, by the restrictions of the contract.

A patent is a monopoly, granted under the statutes of the United States, and the monopoly extends for a period of seventeen years from the date of the issue of the patent. No rights accrue to an employer under a patent granted to an employee, except in the case where there is a distinct written contract between the employer and the employee, or where the conditions of employment are such that a contract may be assumed to exist.

The above statement of the law of the relative rights of employer and employee necessarily follows from the fact that a patent is a monopoly. No one under a monopoly has any rights therein except the person to whom the monopoly is granted. Any other right can only arise by acts done with the knowledge and consent of the party holding the monopoly. Assuming that no contract exists between the employer and an employee, any rights which the employer may claim must be based entirely upon an implied understanding between the employer and the employee. For instance, where an employee makes an invention and uses the facilities of the employer to develop the invention, it will be assumed, as between the employer and the employee, that it was the intention of the employee to permit the employer to use the invention in his business; in other words, that the employer obtains a shop right. If, on the other hand, the employee develops an invention during the term of his employment, and does not use the facilities of the employer, the employer can assert no right which can be maintained. The above applies to that type of cases where the question of invention, as between an employee and an employer, does not arise. Where the question does arise, it reverts back to the original question, to whom the monopoly created by the patent belongs. If, for instance, an employer conceives a patentable idea, such employer is the inventor in the eye of the law, entirely irrespective of the number of employees he may use to perfect and develop his invention. In the case where an employer conceives an invention and then utilizes the services of an employee to develop the invention, and during the progress of development the employee hits upon an idea separate from but which may be combined with the idea originally suggested by the employer, then the patent belongs to the joint inventors, i.e., the employer and the employee; and either or both may utilize, without regard to the other, the right to make, to use and to vend, or dispose of his right to make, to use and to vend, by assignment, license or otherwise.

In order to avoid conflicts between employer and employee relative to the ownership of patents, copyrights, etc., it is advisable that the employer, in suggesting an invention to an employee, make his suggestions in writing and preserve a copy; and where the employee suggests an improvement of a patentable nature such improvement should be put in writing and directed to the employer. Preferably, a written contract should be entered into between the employer and the employee relating to each and every invention in which an employer or employee may hold mutual relations. Many attempts have been made to draw contracts in which an employee agrees to assign to the employer each and every invention he may make during the time of employment. Such contracts, where no consideration other than the usual salary or wages of the employee is stated, are wholly void. A contract may be made with an employee, however, by reason of which the employee agrees, in consideration of a certain sum of money to be paid to him within a definite time, to assign to the employer any and all inventions he may make within that time. There is a difficulty, however, in enforcing such a contract, as the employer is obliged to prove that the invention in regard to which he claims ownership was made within the time covered by the contract. The employee can take the position, and frequently does, that the invention was made prior to the making of the contract or after its cessation.

Efficiency in business management, so far as relates to patents, requires that all matters which may be stated by agreement prior to the act of obtaining a patent should be so stated and not left to the subsequent interpretation of the intention of the parties. Careful examination of a large number of cases which have been tried by the courts relative to the rights of employers and employees has shown that these cases have arisen through failure to take the ordinary precautions usually observed in relations involving property rights.

*Consulting engineer, 66 Broadway, New York.

New Haven Employers' Association

The manufacturers of New Haven, Conn., and vicinity have organized the Employers' Association of New Haven County. Victor M. Tyler, president Sentinel Mfg. Company, is president; Wilson H. Lee, vice-president; Charles G. Phelps, secretary-treasurer. The membership in the city of New Haven alone represents capital of about $50,000,000 and factories employing 35,000 hands. Several organizations of this type have sprung into existence in New England in the past few months. They are the direct outcome of the legislative activities of the several States and of the spread of labor troubles through the various industries. The movement toward local organization of all branches of industry rather than the grouping of concerns in one industry is gaining ground, as it is being rapidly made more plain that forces affecting one industry have some influence upon all others in any one locality. The purposes of these bodies are similar and are clearly expressed by this latest organization in these words:

The equitable adjustment of the relations between capital and labor.

The equitable adjustment of questions of taxation to the end that all property in the State shall bear its just proportion of the public expense.

To promote and encourage cordial relations between employer and employee.

To secure, by co-operation with other organizations or with individuals, rational legislation governing the relations of employer and employee, and to improve the working and social conditions of the employee.

To establish a bureau of statistics where shall be kept the number of employers and of employees in the county, the business, occupation and trades in which they are engaged, and all other statistics necessary to the purposes and success of this association.

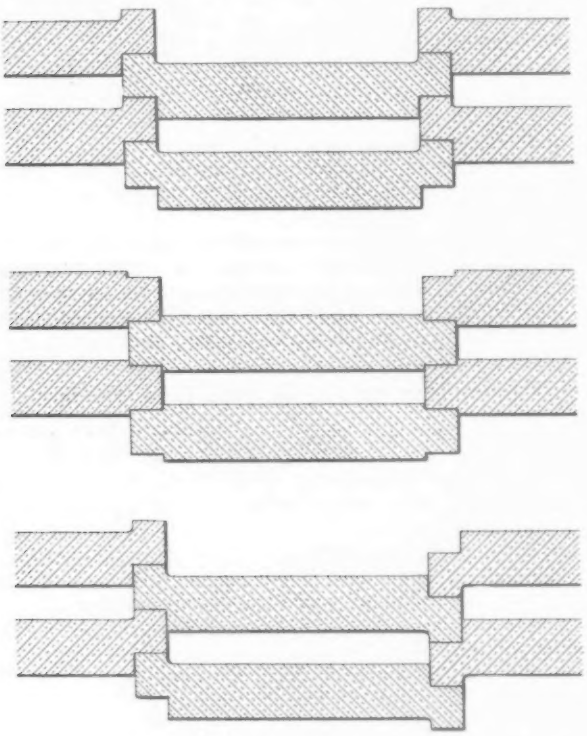
To end, if possible, the economic waste and human suffering caused by strikes and lockouts, by seeking, through the concerted action of the members of this association, to abrogate the causes leading up to them, and effecting such other purposes as may be for the welfare of the association.

The association shall not be conducted for profit, but shall be supported by the dues or subscriptions of its members.

The Lackawanna Iron & Steel Company, March 6, blew in its second of the twin furnaces at the Colebrook plant, Lebanon, Pa. Four of its five Lebanon Valley furnaces are now in operation.

New Flue Structure for Hot-Blast Stoves

An improvement in flue structures for hot-blast stoves has been originated by Julian Kennedy of Pittsburgh. The details are contained in a patent, U. S. 1,167,081, Jan. 4, 1916. The inventor's object is to provide a simple, cheap and effective structure of greater strength which will give a maximum heating surface, which can be readily laid and be built up of one form of brick. The flue structures are formed of vertical rows of slabs having their edge portions superimposed forming relatively thin and wide spaces for the passage of the gas and air. The adjacent rows of the bricks are staggered with relation to each other and each slab has a small recess along its vertical edges for the reception of a slab in an adjacent row. The patentee also pro-



Three Types of Structural Forms for Hot-Blast Stoves

vides staggered joints between the slabs in adjacent rows. The illustration shows three forms of blocks, the upper one having the preference of the inventor. These blocks may be made of suitable refractory material.

The advantages claimed result from the simplicity and cheapness of the structure; from the strength and great heating surface, the heat being rapidly absorbed and given out owing to the air flowing in relatively thin layers between the slabs and also contracting with the ends of the slabs, and from the increased area of support of each of the lower slabs or the supporting piers.

An illustrated booklet on the employment of women on munitions of war has been issued by the Ministry of Munitions of Great Britain. The illustrations show women working on lathes making roughing cuts, doing vise and bench work and acetylene welding, boring 6-in. shells, performing heavy turret-lathe work, and, of course, such lighter occupations as covering aeroplane wings. The book is published by Wyman & Sons, Ltd., London, at a price of 1 shilling.

The Pennsylvania State Highway Department has let a contract for five additional road-making machines to the Galion Iron Works, Galion, Ohio, and two to the J. B. Company, Indianapolis, Ind.

Book Reviews

Inventors and Money Makers. By Frank W. Taussig, professor of economics in Harvard University. Pages 135, 12mo. Published by the Macmillan Company, 64 Fifth Avenue, New York City. Price $1.

The substance of four lectures delivered at Brown University, in connection with the celebration of the one hundred and fiftieth anniversary of the University's foundation, composes the four chapters of this little volume. In discussing the instinct of contrivance, in the first lecture, the author raises the question that "if it be spontaneous, we may be led to conclude that the patent system is a huge mistake," and also the question "whether copyright has aroused genius or evoked literature?" In following up his theory that instinct of contrivance is not in any way dependent upon calculated gain—in other words, that man invents for the love of invention or because his instinct tends to make him follow that course—he takes for his example experiences in the lives of Ericsson, Howe, Morse, Bell, Cartwright, Siemens, Watt and Edison.

In belittling the utility of the patent laws as the prime factor which promotes the progress of arts and sciences, he fails to recognize that one can have, and often does have, the instinct of contrivance without the desire to impart the contrivance or share it with others. Especially is this so if the instinct of contrivance is the exercise of inborn impulse and not combined with the desire for wealth. Here is where the patent law is necessary for the forward march of the industrial arts, or else there will be an increase in the number of lost arts. If the inventor, the man possessed with the instincts of contrivance, is not encouraged to give the results of his impulse and labors to the world, the thing contrived is likely to sink into oblivion.

A discussion of the psychology of money-making is fully presented and, in the main, delightfully put; as well as is his analysis of instincts of collection, of domination, of emulation and of devotion. On the whole, the book is a study in economics from the point of view of the psychologists. E. VAN W.

Oxy-Acetylene Welding and Cutting, Electric and Thermit Welding. By Charles P. Manly. Pages, 415, 4 x 6½ in.; illustrations, 56. Published by Frederick J. Drake & Co., 1325 South Michigan Boulevard, Chicago, Ill. Price, leather, $1.50; cloth bound, $1.

The object in the preparation of this work has been to cover processes which are so closely allied in methods and results with welding as to make them a part of the whole subject of joining metal to metal with the aid of heat. In this way the workman who may wish to handle his trade from beginning to end may become acquainted with certain other operations, preceding or following the actual joining of the metal parts. Among the subjects included are annealing, tempering, hardening, heat treatment and the restoration of steel. To give the user a full understanding of the underlying principles and the materials employed in this work, considerable information has been included on the uses and characteristics of the different metals, the production, handling and use of the gases and other materials employed, and the tools and accessories required for the production and handling of the materials.

An effort has been made to eliminate all matter that has no direct application in practical work and for that reason the descriptions have been limited to methods and accessories actually in use at the present time. The application of the rules laid down by the insurance underwriters governing this work, as well as instructions for the care and handling of generators, torches and material found in a shop are included. The giving of definite directions for handling the different metals and alloys used has received special attention and the instructions have been arranged to form rules. These are placed in the order of use during the work described and the book has been sub-divided in such a way that information on any one point can be secured without spending time in another field. A chapter on oxy-acetylene welding practice includes a number of facts of general use to the expert welder and metal worker.

HEAVY MUNITIONS EXPORTS

Leading Items in a 500 Per Cent Increase—Growing Iron and Steel Imports

WASHINGTON, D. C., March 14, 1916.—That the exports of iron and steel products in January and in the seven months ended January were contracted for at low prices compared with the present market is demonstrated by figures compiled by the Bureau of Foreign and Domestic Commerce. Statistics given in THE IRON AGE last week showed an increase of approximately 200 per cent in the exports of iron and steel products reported by weight, for the seven months ended January, 1916, as compared with the corresponding period of 1915. Statistics now available show that the total value of the exports of iron and steel products for the seven months ended January, 1916, was $300,977,402 as compared with $104,835,738 for 1915, a gain of nearly 200 per cent. As compared with the same period of 1914, when the exports were valued at $155,107,708, the gain is nearly 100 per cent, and as compared with the record shipments of 1913, which aggregated $174,224,356, the increase is 73 per cent.

The exports of all iron and steel products in January, 1916, were valued at $51,643,887 as compared with $18,053,421 in 1915 and $16,706,398 in 1914, a gain of approximately 200 per cent as compared with January of either year.

EXPORTS OF AMMUNITION, ETC.

The most notable feature of the export figures for January is the enormous gain in shipments of unenumerated manufactures of iron and steel, in which category are included shells and shrapnel exported in an unloaded condition. For January, 1915, the shipments of miscellaneous iron and steel were valued at $1,303,979, while for the same month of 1916 the total was $15,277,196. For the seven months ended January, 1915, the total of this class was $8,554,873, but for the corresponding period of 1916 it rose to $64,844,131. This last figure exceeds the high-water mark of 1913 by nearly 500 per cent.

The transfer to the category of explosives of all shells and shrapnel exported in loaded condition renders these statistics of especial interest. For January, 1916, and for the seven months ended January these exports were as follows:

	January, 1916	Seven Months
Cartridges	$3,343,497	$21,708,078
Dynamite	622,932	1,655,282
Gunpowder	10,104,525	72,096,275
All other	12,569,635	85,322,890
Total	$26,640,589	$180,782,545

In the above table shipments of loaded shell and shrapnel are included in "all other" explosives. From these figures it appears that the exports of explosives of all kinds in January, 1916, increased more than 900 per cent as compared with the same month of 1915, while for the seven months the gain was nearly 2000 per cent, the total of 1915 being but $9,258,287.

IMPORTS OF IRON AND STEEL

The steady increase in imports is receiving less than its proper share of notice. Notwithstanding the fact that the principal countries of origin of these products are at war, the total of tonnage commodities has been steadily rising. The imports for January, 1916, amounted to 15,824 gross tons, as compared with 10,569 tons for the same month a year ago, a gain of 50 per cent, while the total for the seven months ended January, 1916, was 194,955 tons, as compared with 158,664 tons for the same period of 1915, and 169,316 for that of 1914. A subjoined table shows in detail the imports of tonnage iron and steel for January, 1916, and for the seven months ended January, as compared with 1915.

Marked gains in our general import trade have been made since the beginning of the current fiscal year, and in spite of the low rates of duty provided by the Underwood-Simmons tariff law, the customs revenues are climbing rapidly. The total value of all imports during January was $135,807,220, as compared with $76,387,094 in 1915 and $94,511,619 in 1914. For the seven months ended January, 1916, the total was $764,644,217, or nearly $200,000,000 more than for the corresponding period for 1915, when the total was $571,321,950, and an increase of nearly $150,000,000, as compared with 1914, when the aggregate was $619,011,462. The low rates of the present tariff law, however, are reflected in the figures showing customs collections, which,

Imports of Iron and Steel

	January		Seven Months	
	1915, Gross Tons	1916, Gross Tons	1915, Gross Tons	1916, Gross Tons
Ferrosilicon	509	599	3,805	2,513
All other pig iron	2,481	8,823	76,374	64,351
Scrap	2,383	4,596	21,406	70,934
Bar iron	551	369	8,148	4,803
Structural iron and steel	316	164	4,936	739
Hoop or band iron	....	....	648	470
Steel billets without alloys	61	20	869	3,459
All other steel billets	1,955	564	18,959	5,389
Steel rails	305	455	14,842	38,425
Sheets and plates	58	146	2,005	953
Tin and terne plates	1,608	62	4,290	344
Wire rods	342	26	2,382	2,575
Total	10,569	15,824	158,664	194,955

although increasing steadily of late, show a deficit of nearly $7,000,000, as compared with 1915, and nearly $92,000,000, as compared with 1913, the last year under the Payne-Aldrich law.

American manufacturers will be interested to know that current importations are paying duties averaging but a fraction above 8 per cent ad valorem as compared with an average of 20 per cent under the Payne-Aldrich law and 25 per cent under the Dingley act. W. L. C.

War Effects on German Iron Trade

"Industry and the War" was the theme of an address before a recent gathering of German engineers at Wurtemberg by Secretary Fröhlich of the Association of German Engineering Works. Among other things he said:

There is no scarcity of the two most important raw materials, coal and iron, and the present production of pig iron and steel exceed the requirements of the empire. Although the commandeering of metals by the Government at first caused great difficulties in the engineering industry, these have been overcome, thanks to the adaptability of the works. Economy in the use of high-speed steel has been necessary. The home trade has been but little affected by the war, and hardly any contracts have been cancelled; although in some cases execution has been postponed until after the war. Very few new contracts have been placed, but their absence was made good by the increased army orders. As a result of the pressure put upon the industry by the military requirements the German works have acquired an experience in the rapid construction of automatic machines and in turning out machines on a wholesale scale which must have a beneficial effect upon the whole industry. The months of war have been months of learning which have laid the foundation of future technical progress. The export trade has suffered greatly, for it must be remembered that in normal times about one-third of the total output of the German engineering works is exported. After the war neutral countries will probably act to a great extent as intermediaries in introducing German goods in what are now enemy countries.

Shipments of the German Steel Works Union in January were 285,784 metric tons as against 264,970 tons in December, 1915, and a monthly average for 1915 of 270,510 tons. The January total was made up of 75,045 tons of semi-finished steel, 157,345 tons of railroad material and 53,394 tons of shapes.

The American Rolling Mill Company, Middletown, Ohio, confirms the report that it has begun shipments on a large contract for 4.7-in. shells placed by the United States Government. The company is rolling the rounds and forging and finishing the shells, so that they are ready for loading and for the detonating devices.

The H. P. Mueller Bronze Foundry, St. Louis, Mo., announces the closing of large contracts with the United States Government for McAdamite metal, a special aluminum alloy, for use in the construction of submarines. The plant is being enlarged.

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EDITORS:
A. I. FINDLEY
GEO. W. COPE W. W. MACON
CHARLES S. BAUR, *Advertising Manager*

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The Youngstown Indictments

Too much importance could easily be given to the indictments against certain steel companies returned by the Youngstown, Ohio, grand jury last week. Their gravest feature is that they bring out in relief to what uses court machinery may come. The defendants are charged with conspiring to fix prices of iron and steel products and to keep down the wages of common labor. The steel companies, and particularly the Steel Corporation because of its size, have become successors to the Standard Oil Company in drawing the fire of ambitious prosecuting attorneys; and it is not surprising that county prosecutors imitate Federal prosecutors. We need go back only two administrations to find an attorney general who referred to the trust prosecutions as a hunt in which there was game to be had for the shooting all along the line.

The political campaign will soon be on in Ohio, and the Valentine anti-trust law of that State has not been particularly productive of late. Along come the Youngstown riots and with them the popular demand for the conviction of somebody. There would be no particular glory in putting rioters in jail; therefore along with the indictment of more than 100 rioters come bills against men of prominence and against companies whose enterprise has brought Youngstown all the industrial prosperity it ever knew.

The Ohio grand jury's ground for charging the steel companies with conspiracy seems to be that when the Steel Corporation announced an advance in wages at Youngstown in January other companies at once made a similar advance. Its members reasoned just like the Congressmen investigating the steel trade, who found like proof of collusion in the fact that when the United States Steel Corporation reduced the price of a given product other steel companies reduced their price.

The Youngstown indictments have been called outrageous; they are all that and more. But the outrage is only a legitimate fruit of many wrongs that have been perpetrated in the name of government, only on a greater scale, ever since the campaign against big business was started at Washington. The Youngstown grand jury evidently found its cue in the diatribes emitted at Washington in January by an agent of the Commission on Industrial Relations. Quite in line with the report he had drafted for the commission, this reckless accuser of employers cited the Youngstown strike as a sign that steel manufacturers could not forever "depress wages below a decent standard by maintaining a vast horde of helpless immigrants in a condition of economic subservience." Yet the record of the Steel Corporation in the years of depression since 1907 has been that it made no wage reduction, though all through the steel industry and in other industries with scarcely an exception labor was reduced, and that three separate advances were made—6¼ per cent in 1910, 10 per cent in 1913 and 10 per cent in 1916—bringing steel works labor to the highest wage ever paid in this country and to more than double the rate in the countries from which these oppressed immigrants came. It may have been for this that the Steel Corporation was given the further distinction at Youngstown of having an indictment lodged against its chairman.

Workmen's Efficiency After the War

There is much discussion of the commercial changes that will be effected by the war; how the various countries will seek foreign markets and how the trade channels will be altered. The subject is both interesting and important, but deductions must necessarily be uncertain, for there will be a contest, and the relative strength of the contestants cannot well be predicted. The contest, as generally conceived, will be between nations, each striving to regain or to build up foreign trade. All we can do is resolve to do our best and strive to prepare ourselves.

There are certain industrial changes, the nature and results of which can be canvassed with much more confidence. We refer to the change of proportion between the sturdy able-bodied men and the less fit, youths, women and ex-soldiers with impaired efficiency mentally or physically. The changes thus effected will be forced by inexorable physical conditions; quite a different thing from the nurture the various governments will endeavor to extend to their industries, and therefore one that can be studied and analyzed with some confidence.

In the countries at war there will be a deficiency in strong, able-bodied men, and there will be relatively a great preponderance of labor fit only for light work. Unquestionably the industries requiring the sturdier labor will be at a relative disadvantage, and the industries requiring light and simple labor

will be at a great advantage, as compared either with conditions in the same countries before the war, or with conditions existing in the United States after the war. Some of our manufacturers, therefore, will find themselves better positioned in the struggle for international trade, and others will find themselves not so well positioned. The situation in this respect will be complicated by the fact that immigration of those who handle the pick and shovel and who work at the coke ovens and blast furnaces and in the steel mills will be very light, as it has been since the war started. In the belligerent countries labor fit for the iron and steel industry with its branches will be at a premium, but on account of the immigration situation much the same condition may be expected in the United States.

The industrial changes that will occur in the belligerent countries may be considered under two aspects: first, changes in manufacturing methods calculated to adapt the operations to less efficient workers; second, a drift from the more strenuous to the lighter operations, whereby some industries will have their costs increased relatively, while others will become relatively crowded and will be able to force their goods upon export markets to better advantage than would otherwise be the case.

As to the first change, what is known as the "Magdeburg idea," referred to at some length in this department in the issue of Jan. 27, looks to the development of methods and appliances adapted to the use of the less fit. Already a great deal of work has undoubtedly been done along this line. In the development of appliances it seems reasonable to hope that American manufacturers of tools will be able to accomplish a great deal, seeing the great success they have achieved in designing machinery to utilize to the fullest the two hands of the workmen, as well as machinery which requires but occasional attention.

Interchangeability of parts in a piece of machinery is distinctly an American principle, and even up to the present time has gained very much less vogue abroad than in the United States. It stands to reason that a tremendous impetus will be given to this practice in manufacturing, since methods in making a given part can be simplified and adapted to the qualifications of the worker, while if the parts are to be fitted as assembled the greatest dexterity is required. Thus the demand for American machinery adapted to the production of parts of standard measurement should be greatly increased.

With respect to the second change, the drift into the easy occupations will doubtless be such as to change in an important way the international competition. American manufacturers of goods produced with light and less dextrous labor may expect a keener contest in the matter of prices, while those who can exercise more or less choice as to the character of goods turned out with the plant facilities may do well to push such goods as require in their production the most efficient labor, taking less chances on goods that can be made by the large number of the relatively unfit the war will turn out.

That the character of the labor available has much to with the class of goods made in a country or in a district is well recognized. The principle can be observed in the United States. Doubtless the distribution of industries as now found has been dictated chiefly by the geographical advantages of different sections, but now that the labor has been trained to its home industry, or has migrated to its habitat, the prospective manufacturer must consider carefully the labor supply of a district before locating his factory there, even though it seems to have great geographical advantages. Much the same principle obtains in the distribution of industries among the different countries, and it is now important to observe that the war is bringing physical conditions whereby the alignments will be changed greatly, with results that the American manufacturer will do well to anticipate.

Proportion of Furnaces in Blast

In these days of strenuous striving for outputs all along the line in the iron and steel industry, the question of how much blast furnace capacity remains idle is an interesting one, though not one that can well be settled except by the test of experience. Between the furnace that is just on the verge of getting into blast to the furnace which is not actually abandoned but which will only blow in under altogether exceptional circumstances there is a great difference. It may be observed that the proportion of furnaces in blast is now very high, though not exceptionally so.

The monthly blast furnace reports of THE IRON AGE have been scrutinized to determine the proportion, in number, of coke and anthracite furnaces in blast in the various periods of activity, starting with that inaugurated in 1897, the proportions comparing as follows with that shown by our report for February, printed a week ago.

Number of Coke and Anthracite Furnaces in Blast

	Total furnaces	In blast	Per-centage
May 1, 1900.....	324	267	82.4
June 1, 1903.....	349	294	84.2
Aug. 1, 1907.....	393	338	86.0
Dec. 1, 1909.....	410	314	76.6
March 1, 1913.....	420	303	71.1
March 1, 1916.....	389	312	80.2

Our list of potentially active furnaces has been revised at various times of late, whereby furnaces that cannot be regarded as in position to blow, even under exceptionally favorable market conditions, have been largely eliminated, and yet it will be observed that in three of the five active periods covered by the above table the percentage in number of furnaces in blast was larger than now. A difficulty at present is that conditions are so exceptional that it is somewhat hazardous to venture to remove a stack from the list of possibilities.

It must be recognized, of course, that the average capacity per stack of the inactive furnaces is very much less than that of the active furnaces. Our review of previous blast furnace performances brought out the interesting fact that while in the active period of 1905-6-7 the largest number of furnaces in blast was 338, on Aug. 1, 1907, as shown above, the daily capacity was 73,446 tons, whereas a larger daily capacity, 73,737 tons, was shown for Dec. 1, 1906, when there were only 315 furnaces in blast. Evidently an unusual proportion of the large furnaces had been forced out of blast for repairs, while the demand for iron was such that smaller

stacks were called upon to contribute what they could. It may be noted that the highest prices for pig iron in that period fell in May, 1907.

What After Railroad Valuation?

Whether for good or for ill, the tendency is clearly in the direction of subjecting property which is employed in trade, manufacture, insurance, banking and many other lines of business, to regulation similar in kind to that now applying to the numerous classes of public utilities.

Speaking to the Traffic Club of Chicago at its recent annual dinner, Pierce Butler, counsel for the western group of railroads, thus warningly directed attention to the Federal valuation of railroads now in progress. In his opinion this appraisal is of larger import to the shipper than the question of freight rates involved in it; of far more importance, also, than the question of the wisdom of expending $100,000,000 to complete the valuation. How manufacturing property might be brought within the reach of like regulation was thus pointed out:

All owners of property are interested in the treatment of public utility properties. If the value of these be impaired by the application of principles of valuation, or conceptions of value, which are economically or morally unsound, the owners of other classes of property which are now deemed to be free from such regulation should bear in mind that the line distinguishing strictly private transactions from a business affected with a public interest is very narrow and quite indistinct, and that a comparatively slight development of or change in the law, or in the circumstances attending the business, may transpose business and property from the class which is now considered private to that which is public in the sense that it is subject to price regulation.

Indeed, it has been decided by the highest court that a public interest may exist in a business, as distinguished from a public use of the property; that such public interest can be the basis of the rate or price fixing power; that the business is the fundamental thing and that the property is but the instrument of the business, and that a business, by its circumstances, may rise from private to public concern and consequently become subject to price regulation.

Manufacturers of iron and steel products are not unacquainted with Government surveillance of price making. The question of prices has indeed been sufficiently at issue between the industry and the Government to establish at least a partial understanding of the Federal attitude. For the present this attitude appears to favor an unhampered operation of the laws of supply and demand without regard to the value of the property or business on whose product the price is made. But, as Mr. Butler points out, the factor of property value may not always be disregarded, nor is there any assurance that it would be determined on a right basis. The methods of determining railroad values now in process of being formulated take little account of present value or value attaching peculiarly to the use of the property, and largely look to an appraisement that will greatly scale down capital assets. The danger here is not remote:

If, in valuation of railroad property, *cost* may be substituted for *value;* if the value of property paid for out of surplus earnings is to be excluded; if the increments in value which have come with the growth of the country and rise of prices are to be ignored; if the earning power under just rates is not to receive consideration, what assurance have the owners of other classes of property—at least of such property as is or may become the instrument of business affected with a public interest—that corresponding elements of value will not be denied to them?

When the railroads first presented their case for an advance in freight rates, increases in the prices of steel and other materials they bought were urged among other reasons. The day may come when an Interstate Commerce Commission will decide to go into the reasonableness of prices of railroad steel as a factor in cost of railroad operation, or again, in connection with the price the railroads should pay for rails, giving the highest guaranty of safety to the public. If it were so determined that a public interest existed, subjecting these products to price regulation, there would not be a long step to the situation assumed above, in which the valuation of steel-making properties would come in the wake of physical valuation of railroads.

Tool Builders Conservative

With the peak of the war demand for machine tools well passed, a fact that larger manufacturers freely admit, more thought is being given to retrenchment in the matter of production. Leading builders have protected themselves for some time by exacting with war orders a sum sufficient to cover the production cost of their machines, but they are now taking greater care not to let their output exceed the orders booked. This especially applies to the so-called single purpose machines for shell work, or standard machines which have been shorn of attachments or otherwise modified to make them more applicable to the production of munitions.

The situation may be summed up in the observation that this is pre-eminently a time for manufacturers to keep their heads cool and study out as far as possible to what condition the machinery market would settle if the war pressure were removed. The advice is commended to newcomers in the machine-tool field, especially those who have engaged in the manufacture of special lathes and who see large profits therein. Machine-tool plants are still abnormally busy, but largely on orders the duplication of which it would be beyond reason to expect. The newer orders, and these are supplementing the war business to a very considerable degree, are for standard machines of proved merit with which industrial buyers are familiar.

Essential to a Successful Engineer

There are six groups of factors which are essential to the successful engineer, according to a preliminary investigation made by the Carnegie Foundation for the Advancement of Teaching, New York City, as follows: 1, Character, covering integrity, responsibility, resourcefulness and initiative; 2, Judgment, covering common sense, scientific attitude and perspective; 3, Efficiency, covering thoroughness, accuracy and industry; 4, Understanding of men, including executive ability; 5, Knowledge of the fundamentals of engineering science, and 6, Technique of practice and of business. Engineers are now being addressed on the subject with the request that they number the six groups in the order of the importance which they attach to them in judging the reasons for engineering success and in sizing up young men for employment or for promotion.

CORRESPONDENCE

In Defense of Semi-Steel

To the Editor: I read with interest what Dr. Moldenke urged as reasons why the term "semi-steel" should not be accepted; also his comments on certain features of my article in THE IRON AGE of March 2. I believe that the most severe critic of foundry practice will agree that my position has not been shaken in the least. My contention is not based alone on the strength of the metal, in so far as either transverse or tensile strength is concerned, but rather on the combination of strength, toughness and homogeneity consistent with machinability in its strict sense. After all, a casting without these features well accentuated cannot be classed as strictly high grade. Dr. Moldenke says that the "material so designated" has none of the properties of steel that make it distinctive as such. This brings up the question, What is or why is steel? Is it not a metal combining maximum strength, toughness, ductility, resiliency, homogeneity and machinability, minus brittleness? And is not its condition made possible by the proper adjustment of each component element with reference to its action on the others? As compared with iron, semi-steel holds fast claim on high and maximum strength, toughness, homogeneity and machinability. Gray iron at best can only lay claim to the medium and minimum of this combination.

As to the dividing lines: What constitutes good, better and best castings? There is a well-defined standard of strength for gray iron, viz., a transverse strength of 2000 to 2500 lb. to the square inch. The tensile test of gray iron is of very little value and inaccurate at best. The transverse strength of well-balanced semi-steel ranges from 3200 to 4000 lb. to the square inch on 1 x 1-in. bars. As to the claims of manufacturers: Every steel maker also claims for his process a high-grade steel. There is no doubt merit in all their claims, yet the fact remains that there is a best steel, and for this best steel a higher price is paid. Why? Is it not by reason of its superiority, the extra cost of and care in production? How is the consumer to judge of its superiority? By the actual test of service. Is there faulty steel? Yes, but that does not and should not condemn all steel. The same questions and answers are equally applicable to semi-steel. There is good, better, best; and the consumer soon learns to judge what is best. The proper grade of pig iron for the semi-steel mixture costs from $2 to $2.50 a ton more than ordinary pig iron; hence there is no fooling the buyer in this respect.

As to the steel in my mixtures being "lost in the shuffle," that was its function. Had it not been lost, or properly disseminated, hard spots or uneven strength would have shown up in the castings. But an analysis of the metal shows clearly its work. Dr. Moldenke bases this "lost-in-the-shuffle" on a glance at the silicon and carbon. I take for granted the fact was overlooked that the silicon and carbon are only pivotal elements. Their final state is largely due to the effects of the manganese and phosphorus. A glance at my mixtures will show the well-balanced elements of phosphorus (low) and manganese (high) made possible by the use of steel scrap and low-phosphorus, high-manganese pig iron.

The manner of getting results was as stated. Beginning at the blower, I adjusted its revolutions to deliver the proper quantity of air for proper combustion; arranged the tuyeres so as to allow the proper volume of air to be delivered by the blower with least resistance; saw that the proper volume of air was delivered; saw to the proper daubing and lining up of the cupola; found its melting zone and held it. I then weighed and accurately charged material of the correct proportions. What came from the "spout" was the net result—liquid metal of the proper consistency. How the metal is handled, the condition of molds, and how the iron is poured have no bearing on the quality of the liquid metal; and the ills of faulty castings from floor errors are easily traceable. In all my experience I have never used one pound more of coke on semi-steel mixtures than for ordinary gray iron, and have yet to see "lifeless" semi-steel metal. I have held the metal in the ladle 5 to 15 min. with no appreciable effect on its fluidity. If I stopped half way in my mixtures, cupola practice and resultant liquid metal, I should indeed be very glad to be enlightened; for I have long since learned that free discussion and being open to conviction are valuable assets to the foundryman.

Y. A. DYER.

Birmingham, Ala., March 8, 1916.

Answering "Help Wanted" Advertisements

To the Editor: The writer for a long time has made a practice of looking over the want advertisements in trade publications regularly, believing them to be a good barometer of business conditions. For instance, in one publication some time ago there were only two "help wanted" advertisements to at least a column of "situations wanted"; in a recent issue of the same periodical the proportion is about fifty-fifty.

Naturally the reading of these advertisements has led to speculation upon their use and result. Probably the two hardest points to cover are references and personality. The applicant wonders what use will be made of his references. If he is employed at the time of the application he naturally desires to give his employer as a reference. At the same time the average workman is afraid that if his employer receives any intimation that a change is contemplated it will engender ill feeling and possibly result in dismissal. On the other hand, a prospective employer does not feel justified in engaging a man without verifying his references; especially in cases where the distance is too great for an application in person.

As to the second point, not many men are really acquainted with their own personalities. Of those who are, only the self-satisfied ones can put it in words. Furthermore, it is questionable how much a description of personality is worth. It has been said recently that only stupid men are thoroughly satisfied with themselves, and observation will bear this out.

It would seem to be sufficient for a man to set forth his actual working qualifications, presenting his references after negotiations have reached a point indicating a reasonable chance of employment. The one who is engaging the employee should be able to gage the personality of the applicant either by reading between the lines or "sizing up" during an interview.

H. D. MURPHY.

Jersey City, N. J., March 8, 1916.

Germany is reported to have taken the extraordinary step of appropriating various household articles made of copper, brass and nickel, the voluntary surrendering of these goods not having brought the desired result. Lists are supplied which have to be filled out and the owner receives in payment only the value of the articles as scrap metal. A professor at the University of Berlin has publicly protested because he received 18c. for a copper can that cost him $1.68; was compelled to give up, for about 64c. a brass article which cost him over $4.25, and besides had to buy an enameled kettle in place of the brass one costing him $1.92.

If the Pennsylvania Railroad system could take up all of its tracks and relay them in a single line, it would have enough to build a standard gage railroad around the world and double track it from New York to Kansas City. The exact length of all the railroad lines in the system, whether single, double, triple or quadruple tracked, is 11,823 miles. Of these lines, 3761 miles have two or more tracks, 828 miles have three tracks and 635 miles have four tracks. In addition, there are 9656 miles of track in the sidings, excluding the thousands of connecting sidings owned by industrial and other plants.

THE PIG-IRON OUTLOOK

Opinions Expressed at the February Meeting of Producers

The American Pig Iron Association has given out for publication the following, which is a condensation of a verbal report made at its meeting in Cleveland, Feb. 18, and which it is said represented the consensus of opinion of the 35 or 40 pig-iron producers present. It is interesting as a matter of record, which may be checked up as the year advances:

"There is every probability of a severe famine in pig iron before another twelve months have gone by, for several reasons. Among these are:

"That under present conditions there is no possibility of importing any iron for at least twelve months to come which would furnish any relief to the situation in Eastern States or elsewhere.

"The exporting of American steel and pig iron in finished and unfinished form and in large quantity is being maintained and this condition is likely to continue for some time.

"There has been an increase in the open-hearth steel making capacity in the country of about 1,750,000 tons per year and at the present time it is being driven to its full capacity.

"There is a very large and increased demand for steel of all kinds for domestic and exporting purposes in spite of the fact that a number of the large interests, such as makers of railroad and agricultural equipment, are not working to full capacity.

"During the past year the increase in new blast furnace capacity has been only slightly over 500,000 tons per annum.

"There are prospects for an increase in the open-hearth capacity in the coming year, from that in existence Jan. 1, of 3,750,000 tons, with an increase of only about 500,000 tons in new blast furnace production for that period.

"There is a very gradual but certain increase in the consumption of pig iron in the foundries of the country, this covering practically all lines, so that the foundry melt is almost up to its maximum.

"The blast furnaces of the country were probably running at capacity in January and the need of constant repairs from this time forward will likely offset in large measure the increased capacity being put in operation during 1916.

"Much of the warrant and speculative iron sold a year ago has practically been absorbed and very little remains in the hands of the original purchasers and this is gradually being disposed of.

"It would seem, according to the best judgment of some of the best authorities, that after the war is over our steel exports might be expected to continue, the material being of different character, being confined to that used in the arts of peace rather than for destructive purposes, and this would continue more or less until such time as European countries might adjust themselves and get running smoothly again, to say nothing of the normal increase in the consumption of iron and steel, which undoubtedly would continue. Our monthly exports are running at 350,000 to 400,000 tons in finished and unfinished steel and these exports are ample at this time to take care of the extra capacity being put in operation.

"For a period of 50 years there has been an increase of 8½ per cent per annum in blast furnace capacity in the country, and based on the 38,000,000 tons capacity per annum we now have [the active capacity was 39,500,000 tons on March 1—EDITOR], this would mean an increase of over 3,000,000 tons annually, which is not being constructed or going into commission, and apparently not contemplated. This would mean that a score of blast furnaces would be needed to take care of this increased consumption, while the new construction in process and under contemplation is less than one-third of that and it takes 12 months to get furnaces going after construction is decided upon.

"Altogether it seemed to be the judgment of those present that it is incumbent on the manufacturers of pig iron in the United States to use their best efforts to get in operation as soon as possible their full capacity and to take every step possible to see that their customers' wants are fully supplied. Furthermore, it was the consensus of opinion of those present that the members of the association should use every effort to prevent a 'runaway' market or abnormal prices, which after all represent the prices paid for only a small portion of the total iron shipped, but would have an extremely disturbing effect upon trade conditions.

"It was pointed out that during 1916 and 1917 there might be a severe shortage of ore and serious difficulty attendant upon its transportation, and blast furnace operation and further blast furnace construction is not likely to be contemplated without satisfactory ore and transportation facilities, especially where the consumption of Northern ore is to be considered."

Export Buyers' League

The Export Buyers' League, New York City, is about to be formed under the direction and supervision of J. R. Pels and F. M. Moore. Mr. Pels is purchasing agent for the Warner Sugar Refining Company and the Miranda Sugar Company of Cuba. Mr. Moore is buyer for Alexander & Baldwin, Ltd., representing Hawaiian Island sugar interests. Membership in the League will also include membership in the Purchasing Agents' Association of New York, 129 Lafayette Street, a branch of the National Association of Purchasing Agents, which also has other branches scattered throughout the country.

The Export Buyers' League will include in its membership only those persons who purchase for export, but will not include any one who personally solicits domestic orders. It is intended to select some location where the members can have lunch together at least once a week, so that they can discuss their various problems and exchange ideas and opinions on subjects of mutual interest.

Enormous Exports from New York

About 40 per cent of the value of exports leaving the port of New York, through which 60 per cent of the country's export business is done, represents war business, such as munitions, uniforms, etc. This statement was made by Dudley Field Malone, collector of the port of New York, in an address before the Cornell University Club of New York, March 11. Exporting lately has been going on at the rate of $60,000,000 per week, and one recent day's total was $21,000,000. Mr. Malone estimated that there are 50,000 loaded cars of freight in the yards, not to mention thousands along the railroad lines leading to the seaboard. Business with the Argentine has increased 55 per cent and there are not ships enough. He agreed that a change in navigation laws is essential. Incidentally he paid a tribute to the officers of the 28 German and Austrian ships interned at New York, for their undeviating assent to regulations and exhibition of honor in a trying crisis.

The Curtiss Aeroplane & Motor Corporation, 65 Churchill Street, Buffalo, N. Y., has taken over the assets and property and assumed all the debts and liabilities of the Curtiss Motor Company. Branch offices will be maintained at the plant at Hammondsport, N. Y., and 1752 Elmwood Avenue, Buffalo. A subsidiary corporation, the Curtiss Aeroplane Company, has been formed with offices at Hammondsport and 65 Churchill and 1200 Niagara streets, Buffalo. This latter company will manufacture and sell aeroplanes and flying boats, while the Curtiss Aeroplane & Motor Corporation will manufacture and sell aeronautical motors.

The Bridge Builders and Structural Society announces that the records of the society, as collected by its secretary, George E. Gifford, show that in the month of February 75 per cent of the entire capacity of the bridge and structural shops of the country was contracted for.

New Tube Plant and Other Gary Work to Cost $25,000,000

Announcement of plans for the expenditure of $25,000,000 in new steel and rolling mill plants and other improvements at Gary, Ind., was made by Chairman E. H. Gary at New York, March 8. The following details are given in Judge Gary's statement:

"We have decided to build, and will promptly commence the construction of a first class tube plant at Gary, Ind. It is estimated the improvements, including ore docks, ore yards, blast furnaces, converting mills, power station, waterworks, sheared plate mill, universal plate mill, continuous mills, lap plate mills, butt mills, job shops and all auxiliary departments will cost $25,000,000. It is probable the plant will be built in two units, the first of which, it is hoped, will be completed in about fourteen months."

It is further learned that the tube plant to be erected at Gary will have a monthly capacity of about 35,000 tons of steel pipe ranging in size from ⅛ in. to 16 in. in diameter. This part of the plant is expected to be completed and in operation by October this year.

In its issue of Jan. 6 THE IRON AGE gave the details then available as to improvements the Steel Corporation had under way or expected to make in 1916. The cost of these, it is now said, will run up to $28,000,000, so that the total of Steel Corporation new construction under way or soon to be started upon is about $53,000,000. This outlay covers work that may take two or three years for its completion. The Gary improvements mentioned in the article of Jan. 6 include four blast furnaces, a duplexing plant consisting of two 25-ton Bessemer converters and two large tilting open-hearth furnaces, a sheared plate mill, 40-in. blooming mill, two merchant mills and four 3000-kw. electric gas engine units. Presumably the cost of these is included in the latest $25,000,000 estimate for Gary improvements.

The Steel Corporation's Largest Order Book

The largest unfilled tonnage at the close of any previous month in the history of the U. S. Steel Corporation was indicated by the report showing 8,568,966 tons on the books Feb. 29, 1916. This is an increase of 646,199 tons over the orders for January and exceeds the previous record of 8,489,719 tons on Dec. 31, 1906, by 79,247 tons. It is also nearly double that of Feb. 28, 1915, of 4,345,374 tons. The following table shows the unfilled tonnage for each month, beginning Dec. 31, 1912:

Feb. 29, 1916	8,568,966	June 30, 1914	4,032,857
Jan. 31, 1916	7,922,767	May 31, 1914	3,998,160
Dec. 31, 1915	7,806,220	April 30, 1914	4,277,068
Nov. 30, 1915	7,189,489	March 31, 1914	4,653,825
Oct. 31, 1915	6,165,452	Feb. 28, 1914	5,026,440
Sept. 30, 1915	5,317,618	Jan. 31, 1914	4,613,680
Aug. 31, 1915	4,908,455	Dec. 31, 1913	4,282,108
July 31, 1915	4,928,540	Nov. 30, 1913	4,396,347
June 30, 1915	4,678,196	Oct. 31, 1913	4,513,767
May 31, 1915	4,264,598	Sept. 30, 1913	5,003,785
April 30, 1915	4,162,244	Aug. 31, 1913	5,223,468
March 31, 1915	4,255,749	July 31, 1913	5,399,356
Feb. 28, 1915	4,345,374	June 30, 1913	5,807,317
Jan. 31, 1915	4,248,571	May 31, 1913	6,324,322
Dec. 31, 1914	3,836,643	April 30, 1913	6,978,762
Nov. 30, 1914	3,324,592	March 31, 1913	7,468,956
Oct. 31, 1914	3,461,097	Feb. 28, 1913	7,656,714
Sept. 30, 1914	3,787,667	Jan. 31, 1913	7,827,368
Aug. 31, 1914	4,213,331	Dec. 31, 1912	7,932,164
July 31, 1914	4,158,589		

Canada's Larger Output of Ferrosilicon

Canada's output of ferrosilicon from electric furnaces in 1915 was 9603 gross tons, valued at $753,406, compared with 6717 tons in 1914, an increase of about 43 per cent. The Electro Metals, Ltd., Welland, Ont., has considerably enlarged its capacity to turn out this alloy. About two-thirds of the Canadian output in 1915 was 50 per cent ferrosilicon and the remainder 75 and 85 per cent grade.

Ferrovanadium exports for 1915 were 840,265 lb. against 770,079 lb. in 1914 and 604,287 lb. in 1913. Expansion in the use of this alloy is indicated by the record for the first year of exports when the total was only 107,418 lb. to June 30, 1911.

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Iron and Steel Markets

PRICES STILL SOARING

Many Advances in Finished Material

Pig Iron Buying on a Large Scale with Prices Higher—Rail Orders for 1917

Any last vestige of doubt as to the runaway character of the steel market is being swept out of the way. Prices reach new danger levels with each week, but demand does not halt on that account; it rather grows. And all the time it is harder to locate the market, $5 a ton difference in quotations on the same material being common.

Here is one large steel producer—the largest of all—naming prices on some forms of finished steel for delivery through next year; another is out of the market entirely; a third is selling for the first half of this year but unwilling to quote for the second half; still another puts its price on plates, shapes and bars at 3.50c. for any delivery, thinking to reduce the pressure of new business.

The Steel Corporation has put out 2.75c., Pittsburgh, for plates, 2.50c. for shapes and 2.35c. for bars, as the prices it is quoting on steel for car and vessel work, deliveries running through 1917. On the other hand are makers who refuse to book so far ahead, considering that in the old way no price would be proof against revision when the turn comes.

Railroads have no fears about buying rails for next year at half the price of bars, with assurance of desired rollings thrown in. Such contracts include 90,000 tons placed at Chicago, representing 50,000 tons for the St. Paul, and 20,000 tons and 15,000 tons for other roads. Of the St. Paul order 10,000 tons was given to Eastern mills. For 1917 rolling at Ensley the L. & N. has ordered 47,000 tons and the St. Louis & San Francisco 46,000 tons.

Railroad bridge work is also an important factor, and the week's rolling stock contracts have been good—about 4500 cars and 275 locomotives. There is foreign inquiry for about 25,000 cars.

The pig-iron movement has more than borne out predictions of late February. Chicago and the East, which were slow in starting, have rolled up a heavy volume, while in northern Ohio there has been some subsidence. Foundry iron prices have advanced, though unevenly. At Chicago malleable pig iron has gone to $19.50, while No. 2 foundry is $18.50. At Buffalo 75,000 tons is under inquiry, including 30,000 tons of Bessemer. Chicago buying has amounted to 175,000 tons in March. The melt of foundry iron is increasing in all districts.

At Pittsburgh buying of basic iron has increased, three lots of the week being 18,000, 15,000 and 12,000 tons. Furnaces are now asking $18.50, Valley, but $18.25 and as low as $18 was done in the recent buying. One steel company has bought 10,000 tons of Bessemer at something less than $21 and is in the market for 50,000 to 60,000 tons more.

There is thus far none of the tension in pig iron that has long been seen in the steel end of the market, nor are there signs of famine conditions, so called, though the upward tendency of prices continues.

The large amount of structural work newly let and pending indicates that high prices have not yet made serious inroads. At Cleveland 13,000 tons has been let for the new union depot, and in northern Ohio 6600 tons of steel has been placed for various plant extensions. Such work is plentiful. At Chicago a 4000-ton warehouse contract has been let and an 8000-ton warehouse job has been put over because of high prices. For the Pennsylvania Railroad hotel in New York 10,000 to 12,000 tons will be required. One fabricating interest has given notice of $5 a ton increase on estimates it has sent out, in view of advances in structural shapes.

A sale of 320,000 boxes of tin plates to the Standard Oil Company for re-export in November and December is reported at the equivalent of $4.35, Pittsburgh, for base sizes.

Advances on black and galvanized pipe effective March 15 are $2 to $4 on the former and $4 all the way to $10 on the latter. Boiler tubes have also been advanced $4 a ton. Skelp and pipe prices have been for some time abnormally close together.

The old material market at Pittsburgh has been excited under heavy buying by the leading consumer. From $18.25 for heavy melting steel last week the price has gone to $19, and dealers have asked $19.50.

Contract coke for the second half of the year has advanced to $3 at ovens, and one contract for 10,000 tons a month has been closed at that figure.

Large export inquiry is pending, including 30,000 tons of barb wire for England and 75,000 tons for France. As high as 4.50c. has been quoted on barb wire for military operations.

Pittsburgh

PITTSBURGH, PA., March 14, 1916.

A year ago at this time the Carnegie Steel Company was operating to about 60 per cent of ingot capacity and had out of blast 25 or more of its 59 blast furnaces. To-day it is operating to 100 per cent or more of its ingot capacity, and only four of its blast furnaces are idle; three of these, one Edgar Thomson, one Mingo and one Bellaire, undergoing repairs which are being rushed as fast as possible, and the small Zanesville stack, an isolated furnace, which has not been operated for some years. This changed condition is typical of nearly all steel companies, and shows convincingly the wonderful change that has come over the steel business in a year or less. Instead of the market giving the appearance of prices having reached the high point, there is every indication that a much higher level of prices is coming fast, and the famine in supply of steel is getting worse. There have again been heavy advances on some lines and others are likely in the near future. Basic pig iron is up at least 25c. per ton; quoted prices on Bessemer iron are 50c. higher; Bes-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Mar. 15, 1916.	Mar. 8, 1916.	Feb. 16, 1916.	Mar. 17, 1915.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	$20.00	$20.00	$20.00	$14.25
No. 2, Valley furnace....	18.50	18.50	18.25	13.00
No. 2, Southern, Cin'ti...	17.90	17.90	17.90	12.15
No. 2, Birmingham, Ala.	15.00	15.00	15.00	9.25
No. 2, furnace, Chicago*	18.50	18.50	18.50	13.00
Basic, del'd, eastern Pa.	19.50	19.50	19.50	13.50
Basic, Valley furnace....	18.25	18.25	17.75	12.50
Bessemer, Pittsburgh ...	21.95	21.45	21.45	14.55
Malleable Bess., Ch'go*..	19.50	19.50	19.00	13.00
Gray forge, Pittsburgh..	18.45	18.45	18.45	13.45
L. S. charcoal, Chicago..	19.75	19.75	19.75	15.75
Billets, etc. Per Gross Ton:				
Bess. billets, Pittsburgh.	45.00	40.00	33.00	19.50
O.-h. billets, Pittsburgh.	45.00	40.00	35.00	19.50
O.-h. sheet bars, P'gh...	45.00	41.00	35.00	20.50
Forging billets, base P'gh	65.00	60.00	55.00	24.00
O.-h. billets, Phila.....	50.00	50.00	42.00	21.52
Wire rods, Pittsburgh...	55.00	55.00	50.00	25.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	2.559	2.559	2.409	1.15
Iron bars, Pittsburgh....	2.40	2.35	2.15	1.10
Iron bars, Chicago.....	2.15	2.15	1.90	1.10
Steel bars, Pittsburgh...	2.75	2.50	2.25	1.15
Steel bars, New York...	2.919	2.669	2.669	1.319
Tank plates, Pittsburgh..	3.00	2.75	2.50	1.10
Tank plates, New York..	3.419	3.169	2.919	1.269
Beams, etc., Pittsburgh..	2.50	2.25	2.00	1.15
Beams, etc., New York..	2.619	2.419	2.169	1.269
Skelp, grooved steel, P'gh	2.20	2.20	2.00	1.10
Skelp, sheared steel, P'gh	2.30	2.30	2.10	1.15
Steel hoops, Pittsburgh..	2.75	2.50	2.25	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Mar. 15, 1916.	Mar. 8, 1916.	Feb. 16, 1916.	Mar. 17, 1915.
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.75	2.75	2.60	1.80
Galv. sheets, No. 28, P'gh	4.75	4.75	4.75	3.40
Wire nails, Pittsburgh..	2.40	2.40	2.30	1.60
Cut nails, Pittsburgh....	2.30	2.30	2.20	1.55
Fence wire, base, P'gh..	2.25	2.25	2.15	1.40
Barb wire, galv., P'gh..	3.25	3.25	3.15	2.10
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	18.00	18.00	17.25	12.00
Iron rails, Philadelphia..	20.00	19.50	19.50	13.00
Carwheels, Chicago	14.50	14.50	13.75	10.00
Carwheels, Philadelphia..	16.50	16.50	16.50	11.00
Heavy steel scrap, P'gh.	19.00	18.00	17.00	12.00
Heavy steel scrap, Phila.	17.00	16.50	16.50	10.50
Heavy steel scrap, Ch'go.	16.75	16.50	14.75	9.75
No. 1 cast, Pittsburgh..	16.00	16.00	15.75	11.25
No. 1 cast, Philadelphia..	17.00	17.00	17.00	12.00
No. 1 cast, Ch'go (net ton)	13.50	13.50	12.75	9.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	3.35	$3.75	$3.75	$1.50
Furnace coke, future....	3.00	2.85	2.50	1.65
Foundry coke, prompt...	3.75	3.75	3.50	2.00
Foundry coke, future...	3.50	3.50	3.25	2.15
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	27.00	27.00	27.37½	15.25
Electrolytic copper, N. Y.	26.37½	26.50	27.25	14.75
Spelter, St. Louis.....	16.50	19.00	20.00	9.12½
Spelter, New York.....	16.75	19.25	20.25	9.62½
Lead, St. Louis.....	7.37½	6.70	6.15	4.00
Lead, New York.....	7.25	6.70	6.25	4.10
Tin, New York.....	54.00	49.00	42.25	52.50
Antimony, Asiatic, N. Y..	44.00	44.00	43.50	21.00
Tin plate, 100-lb. box, P'gh	$4.25	$4.00	$4.00	$3.35

semer and open-hearth billets have sold at the highest prices ever reached; black and galvanized steel pipe has been advanced from $2 to $10 per ton; plates, shapes and bars about $5, rivets $3 and chain $10. Heavy steel scrap is up 50c. to $1, with every sign of the market being higher in the near future. Consumers of steel are nearly frantic over the situation, and those that have not covered their needs over the next six or nine months face the alternative of paying fabulous prices or else doing without the material. It is admitted the situation is dangerous, prices having passed the safety point long ago, but nothing happens to keep them from going up. The mills insist that consumers are putting up prices on themselves, bidding against each other to get material, and practically forcing the mills to take their orders at any prices they care to name. The export demand is having its influence in putting up prices to domestic consumers, and when a stopping place will be reached is a question. There is an insistent demand for two or three times the amount of steel the mills can turn out, and while this condition lasts any hope of prices being held in check is impossible. Predictions of 5c. on plates, shapes and bars and $25 or higher on Bessemer and basic iron are freely made. The mills say they put up prices to check demand, but it fails to be checked. What will happen when the flood tide turns is causing a good deal of apprehension.

Pig Iron.—Conditions in the local market are very active. New inquiry for Bessemer and basic iron is heavy, and there have been some large sales of both Bessemer and basic, with more pending. In regard to the reported inquiry noted last week for 80,000 to 90,000 tons of Bessemer iron, it develops that this inquiry came from the Cambria Steel Company, but the amount wanted is now put at 50,000 to 60,000 tons. It is said the company has already bought 10,000 tons of Bessemer from a Valley furnace at the reported price of $21, but it may have been under that figure. A local interest has bought 6000 tons of standard Bessemer, deliveries 1000 tons a month for last six months of the year, at $20.50, Valley furnace. We also note a sale of 10,000 tons of Bessemer iron for export delivery made by a Cleveland interest, which it expects to ship at the rate of about 500 tons a day, the price being slightly under $21 at furnace. Another sale has been made of 5000 tons of Bessemer for export to Italy at about $21 at furnace, and an inquiry from France is reported for 10,000 tons of Bessemer. There have been some heavy sales of basic iron, and several large deals under way have not yet been closed. A local open-hearth steel plant closed on Tuesday and Wednesday for about 18,000 tons of basic, getting the most of it at about $18, Valley furnace. Another local open-hearth interest has bought 12,000 tons of basic and a third about 15,000 tons, all going at about $18.50, Valley furnace. There have also been some fairly heavy sales of foundry iron, aggregating probably 15,000 to 20,000 tons, for last half delivery, most of it at $18.50 and part at $19, Valley furnace. We note a sale of 2500 tons of malleable Bessemer iron at $18.50, Valley furnace. The Union Switch & Signal Company is in the market for 4000 tons of miscellaneous iron, and will probably close this week. Dover furnace of M. A. Hanna & Co. was out of blast for three or four days while the lining was being repaired, but is again running. All indications favor higher prices on pig iron in the near future, and some in the trade predict that Bessemer and basic iron will go to $25 before July. We quote Bessemer iron at $20.50 to $21, but nearly all sellers are holding for $21, and will not shade that figure. Basic iron is held at $18.25 to $18.50, some sellers asking $19; gray forge, $17.50 to $17.75; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18.50 to $19, all at Valley furnace, the freight rate being 95c. per ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—The situation in semi-finished steel is steadily getting tighter, and, with the demand increasing, there seems to be no limit to which prices may go, unless the pressure for steel is relieved. While Bessemer and open-hearth billets are quoted nominally at $40 to $41, maker's mill, it is said that $45 and higher has been paid, and that any mill that is in position to furnish either kind of billets for reasonably prompt shipment could readily get close to $50. It is said that open-hearth billets have been sold at $45 in the Cleveland district for delivery here, which would be about $46.50 at buyer's mill. We note a sale of 500 tons of ordinary carbon forging billets for third quarter delivery at $65, maker's mill, equal to $67.42 delivered to Pittsburgh buyer. A good deal of new open-hearth steel capacity will come in the market about July, but, in spite of this, consumers seem willing to pay fabulous

prices for billets and sheet bars for delivery in the last half. Nominal prices of steel, over which premiums of $5 or more would likely be paid for reasonably prompt shipment, are as follows: Bessemer billets, $40; open-hearth billets, $40; Bessemer sheet bars, $40 to $41, and open-hearth sheet bars, $41, maker's mill, Pittsburgh or Youngstown districts. We quote forging billets at $65 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra.

Ferroalloys.—The scarcity of ferromanganese has reached a point where some consumers have paid as high as $350 per ton, with reports of $400 having been done for small lots of 80 per cent for quick shipment from stock. Steel companies that make their own ferromanganese are being besieged every day by smaller steel concerns to lend or sell them a car or two of ferromanganese, but are usually met with a refusal, the makers desiring to conserve their entire output for their own needs. The nominal price of English 80 per cent on contracts is $175 to $200, seaboard, with all the restrictions and red tape as regards deliveries that have prevailed for many months, or practically since the starting of the war. We quote domestic 80 per cent ferromanganese for prompt delivery at $350 to $400 per ton, and sales of several lots have been made at the lower price. The supply of ferrosilicon is running very short, and it is being divided around among consumers as fairly as possible, but no consumer is getting more than half, if that much, of the quantity he needs. Prices as high as $125 per ton are quoted on 35 per cent spiegeleisen, and $60 is quoted for 18 to 22 per cent. Prices of Bessemer ferrosilicon for delivery over the remainder of the year are now as follows: 9 per cent, $30; 10 per cent, $31; 11 per cent, $32; 12 per cent, $33; 13 per cent, $34.50; 14 per cent, $36.50; 15 per cent, $38.50, and 16 per cent, $41. Seven per cent silvery for the same delivery is $26.50; 8 per cent, $27; 9 per cent, $27.50; 10 per cent, $28; 11 per cent, $29, and 12 per cent, $30. All these prices are f.o.b. at furnace, Jackson, Ohio; New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of $2 per gross ton to Pittsburgh.

Plates.—Last week the Carnegie Steel Company fixed prices on plates to shipyards and steel-car builders for all of 1917 delivery at 2.75c. at mill. For shipment in third and fourth quarter two local makers of plates are holding firm at 2.60c. at mill, and for delivery in ten to twelve weeks ¼-in. and heavier plates are held at 3c., with reports of sales having been made at as high as 3.50c. at mill. The Chicago branch of the Pressed Steel Car Company has sold 1000 box cars and 500 stock cars to the Chicago & Northwestern, and the local Pressed Steel Car Company has sold 1000 gondolas to the Southern, also fifty steel box cars to the Tin Tsin Pukow Railroad of China and twenty-five general service cars for shipment to France. The Italian State Railways of Italy is reported to be in the market for 2000 steel gondolas and 2000 box cars. The situation in plates as regards supply is getting steadily tighter, and it is very evident some consumers will come far short of getting enough to meet their needs, and it would not be surprising if some consumers might have to shut down entirely, being unable to obtain them. The nominal price of ¼-in. and heavier plates for shipment at convenience of the mill is 2.60c., but for delivery in two to three months 3c. is the general price quoted and in a few cases 3.50c. is being asked.

Structural Material.—The Carnegie Steel Company has established a price of 2.50c. on structural shapes to the shipyards and steel-car builders for all of 1917 delivery. For shipment at convenience of the mill, which would mean in probably last quarter or later, the quoted price is 2.50c. The Jones & Laughlin Steel Company has taken 400 tons for the Ingersoll-Rand Company at Painted Post, N. Y., and the Massillon Bridge & Structural Company 320 tons for an office building at Erie, Pa. Bids have gone in on the proposed Pennsylvania Railroad hotel in New York City, calling for about 10,000 tons, and also on about 2500 tons for a new plant for the Owen-Booth Bottle Machinery Company, Charleston, W. Va. New inquiry is very heavy, and structural mills are loaded up with orders for all they can turn out in the next five or six months. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, the price depending on delivery wanted.

Steel Rails.—It is stated that the Carnegie Steel Company has taken 6800 tons of open-hearth rails for a Western road, and is booking routine orders for small lots of standard sections, ranging from 500 tons up to 3000 tons or more, for delivery this year. Very heavy contracts for rails have been placed for 1917 delivery, the local interest having taken quite a large amount of this business, and its three Edgar Thomson rail mills at Bessemer are said to be filled up for the remainder of this year. We note a very active demand for light rails, running in some weeks 6000 tons or more. We quote light rails as follows: 25 to 45-lb. sections, 1.85c.; 16 and 20-lb., 1.90c.; 12 and 14-lb., 1.95c., and 8 and 10-lb., 2c., in carload lots. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

Sheets.—Mills report the demand heavy for all grades of sheets, especially for blue annealed and special sheets for deep stamping and automobile purposes. The demand for electrical sheets is also very active, and mills making special grades are sold up to October or longer. Some mills have recently put up prices on galvanized and are holding firm at 5c. For delivery in second quarter we quote: Nos. 9 and 10 blue annealed sheets, 2.90c.; No. 28 Bessemer black, 2.75c. to 2.85c.; open-hearth, 2.85c. to 2.95c.; No. 28 galvanized, Bessemer stock, 4.75c. to 4.85c., and open-hearth, 4.85c. to 5c., most of the mills holding for the higher figure. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.60c.; Nos. 25, 26 and 27, 2.65c.; No. 28, 2.75c.; No. 29, 2.85c., and No. 30, 2.90c. These prices are for carloads and larger lots, f.o.b. maker's mill.

Tin Plate.—A leading local maker booked this week contracts from a large consumer for 320,000 boxes of tin plate for export and re-export trade, for which it obtained a price equivalent to $4.35 per base box, deliveries being November and December this year, with a promise on the part of the seller that it will ship out part of the order in October if possible. Specifications against contracts are very heavy and the mills have their output sold up for five or six months. Consumers who have to buy tin plate for last half of the year will have to pay $4 or higher per base box. Sales from stock for fairly quick shipment have been made at $4.25 and as high as $4.50 per base box. We quote 14 x 20 coke plates at $4 per base box for extended deliveries, and $4.25 up to $4.50 for fairly prompt shipment from stock. We quote 8-lb. coated ternes at $7.20 per case for 200 lb., and $7.50 for 214 lb., all f.o.b. maker's mill, Pittsburgh.

Rivets.—Effective Friday, March 10, prices on rivets were again advanced, buttonhead structural rivets ½ in. and larger now being held at $3.15 per 100 lb. base, and conehead boiler rivets $3.25, f.o.b. Pittsburgh, terms 30 days net, or one-half of 1 per cent off for cash in 10 days. Makers state the demand is still very heavy, and larger now being held at $3.15 per 100 lb. base, from the steel mills, their output is being restricted. They report they are well sold up for the next three or four months and considerably back in deliveries.

Cold-Rolled Strip Steel.—Makers report the new demand heavy, with prices very strong and slightly higher. We note sales of 30 tons at $5.25 base, 10 tons at $5.50, 30 tons at $5.60, 25 tons at $6, and 18 tons at $5.50, all for delivery at convenience of the mills. A meeting of cold-rolled strip steel makers was held in the Waldorf-Astoria Hotel, New York City, on Wednesday, March 15, at which standard extras for cold-rolled strip steel under 0.20 carbon, and also over 0.20 carbon were under discussion. The mills have been working on these standard extras for some time and they will likely be adopted in the near future. We quote cold-rolled strip steel at $5.25 minimum up to $6, base, all f.o.b. at mill, Pitts-

burgh, extras that are standard with all the makers being in part as follows:

Base price for 1½-in. and wider, hard, in coils, 0.10 to 0.19 carbon. Extras for size, annealing, cutting, etc., as follows:

Thickness	0.100-in. and thicker	0.050-in. to 0.099-in.	0.035-in. to 0.049-in.	0.033-in.	0.031-in. to 0.034-in.	0.026-in. to 0.030-in.	0.025-in.	0.020-in. to 0.024-in.
Extra for thickness	...	.05	.20	.20	.35	.45	.45	.55
Extra for annealing	.25	.25	.25	.25	.40	.40	.40	.40
Width Extras								
Under 1½ to 1-in. inc.	.15	.15	.15	.15	.15	.15	.15	.15
Under 1 to ¾-in. inc.	.30	.30	.30	.30	.30	.30	.30	.30
Wider than 6, not over 9-in.	...	...	...	...	...	...	.25	.25
Wider than 9, not over 12-in.	...	...	...	.25	.25	.25	.50	.50
Wider than 12, not over 15-in.	...	...	...	.50	.50	.50	...	...
Cut Lengths Extra								
1-in. and wider	.10	.15	.15	.15	.25	.40	.40	.50
Under 1-in. to our limits	.25	.50	.50	.50	.75	.75	.75	.75

Reductions for carload lots of a size. For orders 18 tons or over, one width and gage, shipment at one time, there is a regular reduction from the net price of 15c. per cwt.

For all tempers other than full hard for flat work add annealing extra.

Skelp.—The market is very active, two local makers stating their product is sold up for about six months ahead. Prices are very strong and likely to be higher. We quote grooved steel skelp at 2.25c. to 2.30c.; sheared steel skelp, 2.35c. to 2.40c.; grooved iron skelp, 2.60c. to 2.70c., and sheared iron skelp, 2.90c. to 3c., all delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—Specifications from the railroads are only fairly heavy, but from jobbers and boat yards are active. Prices are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.50; railroad spikes, ½ and 7/16 in., $2.60 base; railroad spikes, ⅜ in. and 5/16 in., $2.90 base; boat spikes, $2.65 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Rods.—None of the local mills is quoting to any extent on new export or domestic inquiries, as their entire output is sold up for five or six months. Some consumers who have lately gone into the market and bought small lots of rods are said to have paid up to $60 per ton. It is not likely that any part of the 10,000 tons of No. 5 rods for shipment to Canada will be taken by local mills, as they cannot make deliveries wanted. We now quote Bessemer, open-hearth and chain rods at $55 to $60, depending on delivery wanted.

Wire Products.—The new demand is active and specifications against contracts are heavy. Local mills rolling wire products are sold up for four or five months, and are very much back in deliveries. Some fairly large export inquiries are out, but local mills are not quoting on these, preferring to conserve their stocks of wire and wire nails for domestic customers. Prices quoted by the mills to the large trade only, on which shipments would not be promised inside of three or four months, are as follows: Wire nails, $2,40; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50; plain annealed wire, $2.25; galvanized barb wire and fence staples, $3.25; painted barb wire, $2.55; polished fence staples, $2.55; cement coated nails, $2.40, base, all f.o.b., Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots; 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b., Pittsburgh.

Shafting.—Specifications from automobile makers and the screw stock machine trade are abnormally heavy and makers are unable to furnish shafting to these customers as fast as needed. New demand is also heavy. Local makers say their output is sold up for six months or longer. We quote cold-rolled shafting at 30 per cent off for carloads and 25 per cent in less than carloads, f.o.b. mill, Pittsburgh, freight added to point of delivery.

Iron and Steel Bars.—Two fairly large inquiries for steel rounds for export were turned down as the mills are sold up so far ahead they cannot make the deliveries. Effective, Friday, March 10, the Carnegie Steel Company fixed its price on steel bars to the shipyards and steel car builders for delivery next year at 2.35c., Pittsburgh. Iron bars are also up about $2 per ton and mills say they are filled up for several months. We quote steel bars at 2.50c. at mill for delivery in third and fourth quarters, and 2.75c. to 3c. for delivery in four to eight weeks, but where bars could be gotten at even these high prices is a problem. Prices from warehouse range from 2.75c. up, depending on quantity and deliveries. We quote refined iron bars at 2.40c. to 2.45c. and railroad test bars at 2.50c. to 2.60c., f.o.b. mill, Pittsburgh.

Hoops and Bands.—Hoops are now 2.75c. and steel bands 2.50c., these prices being for delivery at convenience of the mill, which would likely be in last quarter or later. For delivery in two or three months it is said that $5 or more premium has been offered over nominal prices for both hoops and bands. We quote steel hoops at 2.75c. and bands at 2.50c. for delivery at convenience of the mill, and for shipment in eight to ten weeks we quote steel hoops at 3c. and bands at 2.75c. at mill.

Merchant Steel.—Prices now being quoted by the mills are purely nominal, as mills are sold up for three or four months and are only taking new orders for delivery at their convenience, which would be in third or fourth quarter of this year. Prices are very strong and in small lots are as follows: Iron finished tire, ½ x 1½ in. and larger, 2.35c., base; under ½ x 1½ in., 2.50c.; planished tire, 2.55c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1 x ⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Carwheels.—Makers say new orders are coming in from the steel car and locomotive builders at an unprecedented rate. The Carnegie Steel Company and the Forged Steel Wheel Company are reported as being sold up in carwheels for practically the remainder of this year. We quote 33-in. freight carwheels in lots of 1000 or more at $18; 33-in. tender wheels, $22; 36-in. passenger or tender wheels, $26. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Nuts and Bolts.—One leading maker has advanced prices independently on nuts and bolts about 10 per cent, and it is believed this advance will become general in a short time. New demand continues very heavy, and all the makers are back in deliveries six to eight weeks and have actual orders on their books taking their entire output for the next four or five months. Discounts in effect at this writing, which are said to be for prompt acceptance only, are as follows:

Machine bolts, h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled, 65 and 10 per cent; smaller and shorter, cut, 65 and 5 per cent; larger or longer, 50 and 20 per cent.

Machine bolts, c. p. c. and t. nuts, ⅜ x 4 in., smaller and shorter, 60 and 10 per cent; larger or longer, 50 and 10 per cent.

Common carriage bolts, ⅜ x 6 in., smaller and shorter, rolled, 65 and 5 per cent; smaller and shorter, cut, 65 per cent; larger or longer, 50 and 15 per cent.

Blank bolts, 50 and 20 per cent. Tap bolts, 30 per cent. Bolt ends, with h. p. nuts, 50 and 20 per cent; c. p. c. and t. nuts, 50 and 10 per cent. Stud bolts, rough, 45 per cent; lag screws, cone or gimlet point, 65, 10 and 5 per cent.

Nuts, blank or tapped, h. p. square, 3.70c. lb. off; h. p. hexagon, 3.80c. lb. off; c. p. c. and t. square, 3.50c. lb. off; hexagon, 4.25c. lb. off; c. p. semi-finished, hexagon, 75 and 10 per cent. Finished case hardened nuts, 75 per cent.

Wrought Pipe.—Effective Wednesday, March 15, the National Tube Company and all other makers of steel pipe lowered discounts on black pipe one to two points, an advance of $2 to $4 per ton, and on galvanized steel pipe from two points to five points, an advance of $4 on some sizes and up to $10 on two sizes. On black pipe, all discounts were lowered one point, except 2-in. lap, which was lowered two points, while on galvanized ⅛, ¼ and ⅜ in. butt was lowered five points, but most sizes were lowered two points, or an advance of $4 per ton. The new discounts are given on another page. It is also expected that makers of black and galvanized iron pipe will make corresponding advances. The demand for tubular goods is abnormally heavy, several interests stat-

ing that orders up to this time are nearly three times as great as in the same period last year. Line pipe has been advanced $2 per ton, and casing and oil country goods from $2 to $4 or $5 per ton. The Philadelphia Company of this city has placed about 6000 tons of iron pipe, divided between a local and an Eastern mill, also about 2000 tons of 6⅝-in. casing with a Wheeling mill, and about 1500 tons of 16-in. pipe with a Youngstown mill. The project of taking natural gas from the West Virginia fields to Baltimore, Md., has again been revived. If the line is built it will take about 275 miles of 20-in. pipe about ⅝ in. in diameter, and it will amount to close to 50,000 tons.

Boiler Tubes.—Effective Wednesday, March 15, discounts on steel boiler tubes were lowered two points, equal to an advance of $4 per ton. It is expected the same advance will be made by makers of iron tubes within a day or two. The new demand for boiler tubes is abnormally heavy, makers being sold up for four or five months and back in deliveries for 10 to 12 weeks. The discounts are given on another page.

Old Material.—The local market is somewhat excited, due to reports that the Carnegie Steel Company is again actively seeking large lots of heavy steel melting scrap, and large quantities of turnings for use in its blast furnaces. Reports are that sales have been made at $19 for heavy steel scrap, and it is said up to $19.50 has been done. The Pennsylvania Railroad scrap was let last week, and it is said that about 300 tons brought $19.25, Pitcairn, Pa. The Carnegie Steel Company is reported to have stopped selling its low phosphorus melting scrap, deciding to retain it all for its own use. The minimum price on heavy steel scrap is $18.50, and it is very doubtful whether any considerable lots could be bought in the open market at less than $19. Steel scrap has been offered in the last few days to several large consumers at $19 and was turned down, but it is claimed they would have paid $18.50, but no higher. We therefore quote heavy steel scrap at $18.50 to $19, an advance of about 50c. per ton. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivered	$19.00
Hydraulic compressed bundled sheet scrap	$16.00 to 16.25
No. 1 foundry cast	16.00 to 16.25
Bundled sheet scrap, side and ends, f.o.b. consumers' mills, Pittsburgh district	14.00 to 14.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.00 to 18.50
No. 1 railroad malleable stock	15.50 to 15.75
Railroad grate bars	10.50 to 10.75
Low phosphorus melting stock	20.00 to 20.50
Iron car axles	24.50 to 25.00
Street car axles	22.50 to 23.00
Locomotive axles, steel	24.00 to 24.50
No. 1 busheling scrap	15.25 to 15.50
Machine-shop turnings	10.00 to 10.25
Cast-iron borings	11.00 to 11.25
*Sheet bar crop ends	17.00 to 17.50
No. 1 railroad wrought scrap	18.50 to 18.75
Heavy steel axle turnings	12.75 to 13.00
Heavy breakable cast scrap	14.25 to 14.50

*Shipping point.

Coke.—The car supply in the past week has been better, and as a result prices on standard grades of blast-furnace coke for prompt shipment are lower, being offered now at $3.35 per net ton at oven, as against $3.75 at which sales were made about a week ago. There is not much demand for prompt furnace coke, but prices on contracts for delivery over the remainder of the year, starting with March, and also for last half of the year are very strong. A contract was made a few days ago for 10,000 tons of coke per month for last half delivery at $3 per net ton at oven, and all makers of standard grades of furnace coke are holding this price. The demand for foundry coke on contracts for last half is quite active and prices are firm. We quote standard makers of blast-furnace coke for prompt shipment at $3.35 to $3.50, and on contracts for last half $3 per net ton at oven. We quote standard grades of 72-hr. foundry coke for prompt shipment at $3.75 to $4 and on contracts $3.50 to $3.75 per net ton at oven. The Connellsville *Courier* gives the output of coke for the week ended March 4 as 444,342 net tons, a decrease over the previous week of 918 tons.

Chicago

CHICAGO, ILL., March 15, 1916.—(*By Wire.*)

Pig-iron buying is putting tonnage on the books of the furnaces at a rate comparable with any activity this market has experienced. Reports from selling agencies would indicate that since March 1 sales will easily total 175,000 tons. There also remain unsatisfied various inquiries of importance, including one for 10,000 tons from Western implement manufacturers. The buying of rails for 1917 is well started with the placing of 90,000 tons to be rolled at Chicago and 93,000 tons to be rolled at the Tennessee mill. In connection with the higher prices for shapes, plates and bars which appeared last week, importance arises not so much from any effect upon new business as in the increasing of the spread between plates and shapes now amounting to $5 per ton. As compared with the accepted basis of 2.35c. and 2.60c., Pittsburgh, one prominent Pennsylvania mill is asking 3.50c. for any tonnage it has to sell. The award of 5000 tons of steel for a cold storage warehouse at Chicago, simultaneously with the decision to postpone the erection of the Butler Brothers' warehouse calling for 8000 tons, follows in the former case from a desire to profit from current conditions of easy financing and in the latter case from the desire to avoid the high cost of construction. In the current scarcity of plates there has been unusual opportunity for the use of Bethlehem shapes for plate girder and built-up column construction, as evidenced in a number of recent contracts. Car orders of last week covered 2000, leaving live inquiry for an additional 3000. Chicago prices for blue annealed and one pass black sheets are a notch higher. In the absence of further consumer buying, the scrap market has not had an inflation of prices from the trading activities of dealers in the degree anticipated, and advances above the level of a week ago are moderate.

Pig Iron.—Transactions in pig iron in quantities from 2500 to 4000 tons have been of sufficient number to remove particular importance from individual transactions. Buying has almost been equally divided as to foundry and malleable iron, and aggregate sales since the first of this month are estimated to approximate 175,000 tons. The buying movement has acquired magnitude in very large part by reason of repeat orders. This kind of buying has indicated more than anything else the conservative disposition of melters as regards their acquirements, and is accepted as evidence that pig-iron purchases are supported by corresponding contracts for castings. Inquiry includes 10,000 tons for implement interests at Moline. The market is now well established on the basis of $19.50 for malleable iron, but continues at $18.50 for foundry. Further evidence of quantities of resale iron available for purchase is a disquieting factor, particularly with respect to Southern iron. Sales of iron from the South have not yet brought prices here above $15.50, Birmingham. The scarcity of boats in the transpacific trade has opened up the Pacific coast market to Southern iron, and some sales have been made, particularly to Los Angeles, where dependence is usually had upon Chinese iron. In the territory adjacent to Chicago active selling of charcoal iron is reported. For Lake Superior charcoal iron, we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.00
Northern coke foundry, No. 2	18.50
Northern coke foundry, No. 3	18.00
Southern coke, No. 1 f'dry and 1 soft	$19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft	19.00 to 19.50
Malleable Bessemer	19.50
Basic	19.00
Low phosphorus	34.00 to 36.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	33.50

(By Mail)

Rails and Track Supplies.—Negotiations for 1917 rails have developed sales of about 90,000 tons, of which the largest is to the Chicago, Milwaukee & St. Paul, amounting to 50,000 tons. Of this, 10,000 tons has been distributed to three New York and Pennsylvania mills. Other sales were of 20,000 tons, 15,000 tons, 6000 tons and smaller quantities. The Tennessee Coal, Iron & Railroad Company has booked 47,000 tons for the Louisville & Nashville and 46,000 tons for the St. Louis & San Francisco. The Milwaukee has also been able to place an additional 1000 tons with an eastern Pennsylvania mill for second quarter rolling. An interesting contrast in the prices of light rails, as between local quotations and those made on the Pittsburgh basis, is largely indicative of the sold-up condition of mills elsewhere. Considerable mill capacity ordinarily available for light rails has been turned to the rolling of bars. We quote standard railroad spikes at 2.60c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie plates, $45, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.61c.; 16 to 20 lb., 1.66c.; 12 lb., 1.71c.; 8 lb., 1.76c.; angle bars, 1.50c. to 1.75c., Chicago.

Structural Material.—Contracts placed for fabricated material include 3000 tons for the Central Avenue viaduct, Kansas City, with the Missouri Valley Bridge & Iron Company, and 4000 tons for a warehouse at Chicago. Bridge work of the Burlington Railroad, amounting to 750 tons, was taken by the King Bridge Company. The Missouri Pacific and Great Northern railroads placed orders for about 250 tons each with the Pennsylvania Steel Company and American Bridge Company respectively. Last week's car orders included 500 coal and 1000 box cars for the New York Central, to be built by the American Car & Foundry Company, and 500 refrigerator cars for the Great Northern, to be built by the Haskell-Barker Car Company. Outstanding are the Illinois Central and Burlington inquiries for 900 and 1500 cars respectively, 100 flats for the Milwaukee, 150 coal cars for the Union Pacific and 300 stock cars for Morris & Co., Chicago. An advance of $2 per ton in the mill price of shapes is announced without any apparent effect on market conditions. The most conspicuous instance of structural work deferred in this territory is the Butler Brothers' warehouse, for which 8000 tons will be required. We quote for Chicago delivery of plain material from mill 2.539c.

We quote for Chicago delivery of structural steel from store 2.90c.

Plates.—The inadequate supply of plates is again strikingly indicated in an advance of $5 per ton, which compares with the advance of $2 per ton for shapes and bars. The spread between shapes and plates is now $5 per ton. The Chicago & Northwestern has placed its order for 77 locomotives with the American Locomotive Company. We quote for Chicago delivery of plates from mill for forward delivery 2.789c. and for prompt shipment 3.189c.

We quote for plates out of Chicago stock 3.15c.

Sheets.—Inquiry for sheets continues to emphasize the particular demand for the heavy gages and special finishes. New prices are being quoted by local mills for both blue-annealed and black sheets. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.189c.; box material, No. 17 and lighter, 3.039c. to 3.189c.; No. 28 galvanized, 4.939c. to 5.189c.

We quote for Chicago delivery from jobbers' stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.10c.; No. 28 black 3c. to 3.10c.; No. 28 galvanized, 5.15c. to 5.25c.

Bars.—The volume of bar-iron business is steadily increasing and rolling schedules are now filled, with a steadily growing backlog. The acceptance of orders for prompt shipment at 2.15c. is more restricted, while for the second quarter 2.25c. is a positive minimum. The demand for reinforcing bars is rapidly assuming large proportions and the spring building season promises to bring conditions in this connection paralleling those applicable to other forms of raw material. An advance of $2 per ton is announced in the price of mild steel bars. We quote mill shipments, Chicago, as follows: Bar iron, 2.15c. to 2.25c.; soft steel bars, 2.539c.; hard steel bars, 2.25c.; shafting, in carloads, 45 per cent off; less than carloads, 40 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 2.90c.; bar iron, 2.90c.; reinforcing bars, 2.90c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 15 per cent off.

Rivets and Bolts.—An advance of $3 per ton in the price of rivets is effective this week, bringing the quotation to 3.30c., Chicago. The new demands for bolts and nuts appear to be developing without decrease in volume and the tonnage declined by the manufacturers is believed to exceed by a considerable margin that which can be accepted. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 65-5; cut thread, 65; larger sizes, 50-15; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 65-10; cut thread 65-5; larger sizes, 50-20; gimlet point coach screws, 65-10-5; hot pressed nuts, square, $3.70 off per 100 lb.; hexagon, $3.80 off. Structural rivets, ¾ to 1¼ in., 3.30c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

The unusual relation which store prices have borne to manufacturers' quotations, for some time, has been modified to the extent that quotations out of stock are now on the same basis as the latest manufacturers' prices. We quote out of store: Structural rivets, 3.25c.; boiler rivets, 3.35c.; machine bolts up to ⅜ x 4 in., 65-5; larger sizes, 65; carriage bolts up to ⅜ x 6 in., 65; larger sizes, 50-15 off; hot pressed nuts, square, $3.70, and hexagon, $3.80 off per 100 lb.; lag screws, 65-10-5.

Old Material.—The activity of the dealers in scrap has not carried prices as far above the level established by recent consumer buying as seemed likely a week ago. An advance of $1 per ton for No. 1 busheling and kindred grades was due in large measure to the buying for the mill at Terre Haute. Consumers are generally indicating a disposition to allow the market to become more settled before making further purchases. With respect to steel scrap, the anticipated requirements of a large melter continue a bullish influence. Recent purchases of rerolling rails, in large quantities, through direct transactions which have not had a wide market publicity, establish a level of approximately $18 for this material. Carwheel sales by the railroads have brought out a marked variation in prices. A large tonnage of railroad scrap is being sold without being listed for general quotations. The Michigan Central is offering 2000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.00 to $18.50
Relaying rails	19.50 to 20.50
Old carwheels	14.50 to 15.00
Old steel rails, rerolling	18.00 to 18.25
Old steel rails, less than 3 ft	16.75 to 17.00
Heavy melting steel scrap	16.75 to 17.25
Frogs, switches and guards, cut apart	16.75 to 17.25
Shoveling steel	16.50 to 17.00
Steel axle turnings	12.25 to 12.75

Per Net Ton

Iron angles and splice bars	$17.50 to $18.00
Iron arch bars and transoms	18.75 to 19.25
Steel angle bars	15.75 to 16.00
Iron car axles	20.00 to 20.50
Steel car axles	24.00 to 24.50
No. 1 railroad wrought	16.00 to 16.50
No. 2 railroad wrought	15.00 to 15.50
Cut forge	15.00 to 15.50
No. 1 busheling	13.75 to 14.25
No. 2 busheling	10.00 to 10.25
Pipes and flues	12.00 to 12.50
Steel knuckles and couplers	15.50 to 16.00
Steel springs	15.75 to 16.25
No. 1 boilers, cut to sheets and rings	12.25 to 12.50
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	17.00 to 17.50
Machine shop turnings	8.25 to 8.50
Cast borings	7.50 to 7.75
No. 1 cast scrap	13.50 to 14.00
Stove plate and light cast scrap	11.75 to 12.25
Grate bars	11.00 to 11.25
Brake shoes	11.25 to 11.50
Railroad malleable	14.00 to 14.50
Agricultural malleable	11.75 to 12.25

Wire Products.—The rapid advance in wire prices seems not to have checked the activity of buying, and carload business to jobbers is sustained in record-breaking tonnage. Jobbers report that materials are moving too rapidly through their hands to permit the accumulation of large stocks and the conclusion suggests itself that retailers have prepared for a heavy

consumer demand. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $2.439; wire nails, $2.589; painted barb wire, $2.739; galvanized barb wire, $3.439; polished staples, $2.739; galvanized staples, $3.439, all Chicago.

Cast-Iron Pipe.—Lettings to come up in the current week include 4300 tons at Cleveland, Ohio; 1200 tons at Jackson, Mich., and 1000 tons at Salt Lake City. At St. Louis all bids were rejected and new tenders will be asked on the 7200 tons. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $32.50 to $33; 6 in. and larger, $29.50 to $30, with $1 extra for class A water pipe and gas pipe.

Philadelphia

PHILADELPHIA, PA., March 14, 1916.

Advances in the quotations for steel products are becoming monotonous, but there is no indication that the end of the upward trend is near; on the contrary, higher prices are generally predicted. Famine prices are being paid without hesitancy. Buyers who urgently needed prompt deliveries of steel boiler plates have paid 5c. and over for small quantities. For 80 per cent spot ferromanganese $400 is asked, and 50 per cent is quoted at $5 per unit, with little to be had. Spiegeleisen is scarce, and $60 has been paid for 20 per cent. Foundry grades of iron continue quiet, although about 25,000 tons of pipe iron has been taken by Virginia cast-iron pipe shops. Furnace operators are feeling round for contract coke, and the market is stiffer. For heavy melting steel scrap $17 has been paid, and the market generally is stronger, largely because of activity in the West, to meet which material has been shipped from this territory.

Iron Ore.—Arrivals of foreign ore at this port in the week ended March 11 consisted of 5953 tons from Sweden and 17,650 tons from Cuba.

Ferroalloys.—The quotation for future deliveries of 80 per cent ferromanganese is strictly nominal at $175, seaboard, dealers having none to sell. A small quantity of spot has been taken at $350, but it is not believed that less than $400 would now be accepted. Material running up to 50 per cent has been sold at $4 per unit, but $5 is now the asking price. Spiegeleisen is exceedingly difficult to obtain, and sales of 20 per cent, last half delivery, have been made at $60. The situation has been made more complicated by the desire of consumers to take much more than their usual quantities where they can find sellers. The entire situation is most uncertain, the statement frequently being heard that consumers will pay whatever is asked. Bessemer ferrosilicon is unchanged at $35.44, Philadelphia; while 50 per cent ranges from $83 to $85, Pittsburgh, according to quantity. An arrival last week of 500 tons of 80 per cent ferromanganese is reported.

Pig Iron.—About 25,000 tons, principally for last half delivery, has been purchased in the past few days by Virginia makers of cast-iron pipe. The business was shared by Virginia and Alabama furnaces, and it is understood that full prices were paid. A local maker of malleable iron castings purchased about 1800 tons of malleable pig iron for last half delivery at a price which indicated close competition. Business in foundry grades has been confined to small lots. The quotations for eastern Pennsylvania No. 2 X show considerable variance, as, while $20 at furnace is quoted by some makers, it can be had at $20, Philadelphia, without difficulty, and probably at less. Virginia No. 2 X is unchanged at $18, furnace, or $20.75, delivered, but this price has been shaded where iron could not be delivered to original purchasers because of the freight embargoes and was diverted to other buyers. The freight situation is better, at least temporarily, but far from good. The New York, New Haven & Hartford Railroad raised its embargoes for four days, ending at midnight to-day, but some Virginia furnaces did not get the full benefit of the relief. There appears to have been delay in giving official notification to the Norfolk & Western Railroad of the opening of the New Haven line, and three days were lost. It was not until the fourth day that one shipper was notified that his New England freight would be received, the road having previously refused to accept it because it had not been officially notified. Meantime the iron company was having its troubles in explaining to its customers. Furnaces continue to be embarrassed by the difficulty of securing coke, and in some cases the low supply has caused off iron, there being so little fuel on hand that it had to be forked. No activity in basic is reported. For standard low phosphorus there has been a steady demand for quantities ranging from 500 to 4000 tons, the latter quantity having been taken by a New Jersey steel works. The minimum quotation for standard low phosphorus is slightly over $32, delivered. Lebanon low phosphorus, of which some 10,000 tons has been taken for last half delivery in the past few days, commands from $30 to $32, furnace, practically the same as standard. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.75 to $20.75
Eastern Pa., No. 2 plain	19.50 to 20.50
Virginia, No. 2 X foundry	20.75
Virginia, No. 2 plain	20.25
Gray forge	19.00 to 19.50
Basic	19.50 to 20.00
Standard low phosphorus	32.00

Plates.—Famine prices are being paid for boiler plates in a few instances where the need is great. Moderate-sized lots have been taken at 5c., Pittsburgh, tank steel basis, to which must be added freight and extras. In another instance 5.25c., Pittsburgh, was paid for the material required for two marine boilers. Two leading Eastern companies quote 3.659c., Philadelphia, as their minimum for deliveries several months away. Another maker adheres to 3.409c., Philadelphia, but has not a wide range of product. The leading Western maker quotes a minimum of 2.905c., Philadelphia, with none to sell. The demand is general and heavy, one maker turning down orders for six times the quantity that is booked.

Bars.—The makers of steel bars nominally quote 2.509c., Philadelphia, but cannot make deliveries. Merchants who have stocks are about the only source of prompt supply, and they make prices to fit the case. Iron bars are unchanged at 2.559c., Philadelphia. The inquiry for steel rounds is good, and 4c. to 4.25c. has been paid. The demand is running mostly to the larger sizes.

Structural Material.—To its best customers a representative mill quotes 2.50c., Pittsburgh, or 2.659c., Philadelphia, second quarter delivery. To others it quotes 2.905c., Philadelphia, and in some cases 2.75c., Eastern mill. The demand is strong and of a miscellaneous character. No large building propositions are in evidence here, but there are several small ones pending. The Lenoir Car Works finally closed for the plates and shapes for which it has been in the market for several weeks, the original tonnage of which was cut down.

Billets.—Eastern Pennsylvania makers are quoting about $50 for open-hearth rerolling billets, and $65 for forging steel. There is a heavy demand for third quarter deliveries.

Sheets.—No. 10 blue annealed sheets are very strong at 3.50c., Pittsburgh, or 3.659c., Philadelphia.

Rails.—Now that the mills have opened their books for first half of 1917, it is expected that the railroads will become more active in getting authorizations to buy. Some business with Southern roads has practically been closed.

Coke.—Furnace operators are showing considerable interest in contracts. Last half contract furnace coke is quoted at $3 to $3.50, per net ton at oven, and spot at about $3.75. Spot foundry is quoted at $4 to $4.25 per net ton at oven, and contract foundry at $3.50 to $3.75. Labor is scarce in the coke fields. The freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The sentiment of the market is considerably improved since the greater activity in the West, and sales have been somewhat heavier, although

the market could be more active. For heavy melting steel $17 has been paid. The railroad offerings this month went at good prices. Turnings are stronger because of shipments made to western Pennsylvania. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$17.00 to $17.25
Old steel rails, rerolling	19.00 to 20.00
Low phos. heavy melting steel scrap	22.50 to 23.25
Old steel axles	25.00 to 26.00
Old iron axles	27.00 to 28.00
Old iron rails	20.00 to 20.50
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	22.00 to 22.50
Wrought-iron pipe	15.25 to 15.75
No. 1 forge fire	14.50 to 15.00
Bundled sheets	14.50 to 15.00
No. 2 busheling	11.00 to 11.50
Machine shop turnings	10.00 to 10.50
Cast borings	11.00 to 11.50
No. 1 cast	17.00 to 18.00
Grate bars, railroad	13.00 to 13.50
Stove plate	13.00 to 13.50
Railroad malleable	15.00 to 15.50

Cincinnati

CINCINNATI, OHIO, March 15, 1916—(*By Wire*).

Pig Iron.—The scarcity of malleable, as well as the heavy tonnage that has been sold lately, has tended to make it stronger than foundry iron. In southern Ohio it is difficult now to obtain any malleable for nearby shipment and it is firmly held at $19, Ironton. In the past few days a Michigan manufacturer contracted for 1500 tons of malleable for last half shipment and an Indiana consumer took 800 tons, while numerous smaller lots were booked for the same delivery. Some Northern resale foundry iron has appeared, and while the furnaces are holding at $19, Ironton, a few contracts have been made below this figure. Southern iron is unchanged at $15 to $15.50 for first half and $15.50 to $16 for last half. It is understood that basic users in this territory have about covered for their requirements this year. The largest order reported was given by a southern Indiana firm for approximately 7000 tons of mixed grades made up of 4500 tons of Southern foundry, 1600 tons of Northern foundry from a Lake furnace and 500 tons of Lake Superior charcoal, with a small lot of Ohio silvery, all for this year's shipment. A Michigan consumer has contracted for 1500 tons of Lake Superior charcoal and a manufacturer in the same locality bought 1500 tons of Ohio silvery. Other last half sales include 700 tons of Valley Bessemer to a Central Western consumer, 1000 tons of Southern foundry for a Kentucky melter and 1000 tons of Northern foundry for a central Ohio consumer. The total number of small orders for foundry iron does not quite equal the previous week's showing. The foundry iron inquiry is lighter and the largest order being figured on is for 1000 tons of Southern iron wanted by the Louisville & Nashville Railroad. An Indiana melter is expected to buy this week 500 tons of Northern foundry. An Illinois company is asking for approximately 6000 tons of malleable, 2500 tons of which is for one of its Indiana subsidiary plants. Although $27 at furnace is the price on 8 per cent Ohio silvery iron, this has been shaded on nearly all business placed last week. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$18.40 to $18.90
Southern coke, No. 2 f'dry and 2 soft	17.90 to 18.40
Southern coke, No. 3 foundry	17.40 to 17.90
Southern No. 4 foundry	16.90 to 17.40
Southern gray forge	16.40 to 16.90
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	25.40 to 25.90

(*By Mail*)

Coke.—Foundry contracting continues brisk and quite a large tonnage has been sold for the 12 months beginning July 1. The contract price on Connellsville foundry coke ranges from $3.50 to $3.75 per net ton at oven; Wise County, $3.50 to $4, and New River, $4 to $4.25. Contract figures for Connellsville furnace coke range from $2.25 to $2.60 at oven and prompt shipment quotations run from 50c. to $1 higher than contract.

Finished Material.—Local warehouse prices are unchanged, with the exception of cold rolled shafting which is now quoted at list for rounds and 2 per cent extra is added for flats, squares and hexagons. Steel bars from stock are 3c. base; twisted steel bars, 3.15c.; flats, ¼ in. and thicker, 3.50c.; structural shapes, 3c.; No. 10 blue annealed sheets, 3.25c.; No. 28 galvanized sheets, 5.15c. to 5.20c. The mill price on No. 28 galvanized sheets is 5.15c., Cincinnati, or Newport, Ky., and on No. 28 black 3.05c.

Old Material.—Prices have advanced about 25c. per ton with the exception of heavy melting steel scrap, which is 75c. higher. The demand for heavy melting steel continues quite heavy. The minimum prices given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$11.00 to $11.50
Old iron rails	15.75 to 16.25
Relaying rails, 50 lb. and up	22.00 to 22.50
Rerolling steel rails	14.50 to 15.50
Heavy melting steel scrap	15.00 to 15.50
Steel rails for melting	14.25 to 14.75

Per Net Ton

No. 1 railroad wrought	$13.75 to $14.25
Cast borings	7.00 to 7.50
Steel turnings	6.75 to 7.25
Railroad cast scrap	12.00 to 12.25
No. 1 machinery scrap	13.75 to 14.25
Burnt scrap	9.00 to 9.50
Iron axles	19.50 to 20.00
Locomotive tires (smooth inside)	14.25 to 14.75
Pipes and flues	10.50 to 11.00
Malleable and steel scrap	11.00 to 11.50
Railroad tank and sheet scrap	9.00 to 9.50

Buffalo

BUFFALO, N. Y., March 14, 1916.

Pig Iron.—The selling situation is phenomenally strong, unusual activity in demand having developed in the last two or three days. The total inquiry now before the Buffalo market from tributary territory aggregates 75,000 tons. Over 60,000 tons is comprised in four inquiries—one for 30,000 tons of Bessemer; one for 25,000 tons of foundry grades; one for 6000 tons of malleable, and one for 6000 tons of basic. The remainder is made up of much smaller lots. Inquiry from New England and other Eastern markets is very large, owing to the temporary lifting of the freight embargo. Users of malleable and foundry iron for railroad supplies and accessories are rapidly becoming busier. Three foundries in this immediate vicinity are melting a total of upward of 1000 tons daily besides heavy melting by other nearby foundries. Some consumers are already ordering out their last half quotas from furnaces. Other railroad supply foundries whose stocks are becoming diminished will soon be in the market for replenishment, which will swell the inquiry materially. One Buffalo furnace reports the sale of 125 tons of 2.50 silicon iron for shipment to Chile, South America, and a smaller tonnage of similar grade for Vera Cruz, Mexico. Prices are advancing, $20, furnace, now being the minimum with one or two producers for No. 1 and No. 2 X foundry and malleable, although one maker is still selling under that figure. We quote as follows for current and last half delivery, f.o.b. furnace, Buffalo:

No. 1 foundry	$19.50 to $20.00
No. 2 X foundry	19.00 to 19.50
No. 2 plain	18.75 to 19.00
No. 3 foundry	18.75 to 19.00
Gray forge	18.75 to 19.00
Malleable	19.00 to 20.00
Basic	19.00 to 20.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—The demand for contracts has slackened while requests for the placing of specific orders has increased. The various selling agencies have advanced prices for forward contracts. The demand for cold rolled steel continues to be very heavy, with many inquiries that are unable to find acceptance. Tin plate

is in very active demand. The demand for cement coated nails has also been very heavy. The Ferguson Steel & Iron Company has received contract for 1500 tons of structural shapes for the Furniture Exchange Building to be erected at Jamestown, N. Y.; also 150 tons for a store and apartment building in this city and 200 tons for a building for the Scranton Theater Company, Scranton, Pa.

Old Material.—The market continues very strong and active, with large sales of heavy melting steel, and an increase in price of 50c. per ton over last week. The price schedule also shows an increase of 50c. per ton on railroad malleable stove plate, wrought pipe, bundled sheet scrap and No. 2 busheling scrap and 25c. per ton on machine shop turnings. As is usual on an advancing market, dealers are discounting the future and are offering in some cases more than the mills are paying, figuring on being able to sell at an increased price within a very short time. In the present condition of the market a good sized order would be likely to increase prices materially in some lines. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$17.50 to $18.00
Low phosphorus steel	21.00 to 21.50
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast, scrap	16.00 to 16.50
Old steel axles	24.00 to 24.50
Old iron axles	24.00 to 24.50
Old carwheels	15.25 to 15.75
Railroad malleable	15.75 to 16.00
Machine shop turnings	8.00 to 8.50
Heavy axle turnings	12.00 to 12.50
Clean cast borings	9.25 to 9.75
Old iron rails	17.50 to 18.00
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.50 to 12.00
Wrought pipe	13.50 to 14.00
Bundled sheet scrap	12.50 to 13.00
No. 1 busheling scrap	14.50 to 15.00
No. 2 busheling scrap	11.50 to 12.00
Bundled tin scrap	15.00 to 15.50

Cleveland

CLEVELAND, OHIO, March 14, 1916.

Iron Ore.—Shippers are making preparations to start their ore boats at the earliest possible moment, and it is probable that the first cargoes will leave Escanaba about April 1. The wage committee of the Lake Carriers' Association is holding a meeting in Cleveland and it is probable a substantial advance will be made in the wages of sailors. Dock shipments are heavy, although the car shortage is causing some inconvenience. We quote prices as follows, delivered at lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The demand for foundry iron has subsided somewhat in this territory, but local selling agents continue to book considerable business in other districts where the active buying movement is still in progress. Order books are well filled for the remainder of the year, and one Valley interest has withdrawn from the market. Prices are firm at $18.50 at Cleveland and Valley furnaces for No. 2 foundry, and one Valley furnace has put up its price to $19. The Toledo price has been advanced to $20 for No. 2 foundry and malleable. Bessemer iron is firmer, and a Cleveland interest has quoted $21.50 on a large inquiry from the Cambria Steel Company for early shipment. Southern iron is firm, and sellers claim that the $16 Birmingham price for No. 2 can no longer be shaded for the last half. The American Stove Company has purchased about 5000 tons of iron for last half delivery, 2000 tons of Northern foundry, 2000 tons of Southern and 1000 tons of silvery for its Bedford, Ohio and Indianapolis plants. The silvery was bought from a Tennessee furnace at a price considerably lower than is quoted by southern Ohio producers. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	19.00
Northern No. 2 foundry	19.00
Southern No. 2 foundry	$19.50 to 20.00
Gray forge	18.45
Jackson Co. silvery 8 per cent silicon	28.62
Standard low phos., Valley furnace	32.00

Coke.—The market is inactive. Few foundries at present are placing contracts for their last half requirements. We quote standard Connellsville foundry coke at $3.75 per net ton at oven for contracts and $4 and higher for prompt shipment. Furnace coke is held at $3 for last half contracts and $3.75 for prompt shipment.

Finished Iron and Steel.—Their inability to secure steel is daily becoming a more serious problem with some consumers to whom prices are only a secondary consideration. Sharp price advances were made during the week. The Carnegie Steel Company has advanced its price on steel bars and structural material to 2.35c., and to 2.60c. on plates. The Cambria Steel Company has put up its prices to 3.50c., Pittsburgh, on steel bars, plates and structural material. Some contracts have been placed without prices, these to be fixed at the market by June 15 for third quarter and by Sept. 15 for the fourth quarter. An Eastern mill has advanced its prices for structural material to 3c. for the second quarter. The advancing prices have brought out a large amount of structural work. During the week the American Bridge Company gave notice that the prices on work on which it had quotations out would be advanced $5 per ton within the next few days. The Cleveland office of this company closed contracts for 23,600 tons as follows: 5000 tons for the Forest City Hotel, Cleveland; 2100 tons for a factory building for the Toledo Glass Co. near Charleston, W. Va.; 2500 tons for plant extensions for the Firestone Tire & Rubber Company, Akron, Ohio; 1000 tons for an addition to the Newburg works of the American Steel & Wire Company, and 13,000 tons for other Cleveland work, the identity of which is not revealed. The Massillon Bridge & Structural Company, Cleveland, has taken 2500 tons for a factory building for Hubbard & Company, Pittsburgh. Among new inquiries is one for 2200 tons for approaches to the Chesapeake & Ohio bridge in Cincinnati. The contract for the twelve-story free hotel building in Cleveland has been awarded to Wells Bros., Chicago. The plate market is active and local mills have advanced prices, one now quoting a minimum of 3.25c. and another 3.50c., Pittsburgh, for early delivery. An Eastern plate mill has advanced its prices to 3.60c. for the third quarter. The Hydraulic Pressed Steel Company, Cleveland, came into the market during the week for 24,000 tons of light plates for last half delivery and succeeded in covering for a part of this tonnage at a price of 3c., Pittsburgh. A peculiarity of the market is that, owing to the greater demand for heavy gages, ¼-in. plates are higher than the lighter gages of black and blue annealed sheets. We quote sheets at 2.75c. to 2.85c., Ohio mill, for No. 28 black, 3c. for No. 10 blue annealed and 4.90c. to 5.15c. for No. 28 galvanized. A local sale of forging billets has been made at $65, Eastern mill, or about $66.50, Pittsburgh. A Cleveland mill is quoting open-hearth steel billets at $43 and sheet bars at $45, Cleveland, and reports the sale of a round lot of sheet bars at the latter price. Hard steel bars are quoted at 2.35c., Pittsburgh and iron bars at 2.25c., Pittsburgh. The demand for steel from warehouses is very heavy, and warehouses are unable to keep up with deliveries or keep their stocks replenished. Warehouse prices have been advanced $5 a ton on bars and structural material to 3.25c., and $10 a ton on plates to 3.65c.

Bolts, Nuts and Rivets.—Local makers have advanced rivet prices $3 a ton to 3.15c., Pittsburgh, for structural and 3.25c. for boiler rivets for carload lots for prompt shipment only. The demand for bolts and nuts continues heavy. Prices are unchanged, but may be advanced any day. Some contracts are being placed for the second quarter, but most makers refuse to sell for delivery beyond July 1. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 65 & 5; cut thread, 65; larger or longer, 50 & 15; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 65 & 10; cut thread, 65 & 5; larger and longer, 50 & 20; lag bolts, gimlet or cone point, 65, 10 & 5; square h.p. nuts, blank or tapped, $3.70 off the list; hexagon, h.p. nuts, blank or tapped, $3.80 off; c.p.c. & t. square nuts, blank or tapped, $3.50 off; hexagon nuts, all sizes, $4.25 off; cold pressed semi-finished hexagon nuts, all sizes, 75 & 10 off.

Old Material.—The market is somewhat more active than it was during the past week or two, and prices are very firm. The heavy buying of steel scrap in the Pittsburgh district has caused an advance in the local market of about 75c. a ton, and some heavy melting steel scrap has been taken on by a local mill at $17.50. We note the sale of 1000 tons of heavy melting steel scrap to a Canton mill at $18.50. The Youngstown market is quiet. The demand for busheling has improved, local mills taking on some tonnage at $14.50 to $14.75. We quote f.o.b. Cleveland as follows:

Per Gross Ton

Old steel rails	$16.50 to $17.00
Old iron rails	19.00
Steel car axles	25.00 to 26.00
Heavy melting steel	17.00 to 17.50
Old carwheels	14.00 to 14.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.00 to 14.25
Railroad malleable	16.75 to 17.25
Steel axle turnings	13.25 to 13.50
Light bundled sheet scrap	14.00 to 14.25

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	8.50 to 8.75
Iron and steel turnings and drillings	7.75 to 8.00
No. 1 busheling	14.50 to 14.75
No. 1 railroad wrought	17.50 to 18.00
No. 1 cast	14.25 to 14.50
Railroad grate bars	12.00 to 12.25
Stove plate	12.00 to 12.25

Rudolph C. Koblitz and Marton B. Koblitz, Cleveland, have formed a partnership, under the firm name of R. C. Koblitz & Son, to engage in business as wholesale dealers in metals and rubber. They have leased a warehouse on Canal Road.

Birmingham

BIRMINGHAM, ALA., March 13, 1916.

Pig Iron.—Considerably over 100,000 tons of pig iron was booked by Birmingham district operators in the first 10 days of March. From the middle of February bookings have been approximately 225,000 tons, mainly for last half. These sales were made on the basis of $15 and $15.50 for first and second halves, with 50c. additional obtained in many instances. Prices were probably more uniform than they have been in months, the Tennessee Company having receded from its quotation of $16 for second half and joining the other at $15.50. The Middle West has been an especially large buyer. Inquiries on hand are for large amounts for the remainder of the year. The Alabama Company reopened its books for Clifton high silicon in response to request and sold three lots of 1000 tons each of varying analysis at $17.50, $18 and $18.50. The Woodward Iron Company is considering resuming at Vanderbilt furnace No. 2. The Tennessee Company is well supplied with rail orders and other demands on its basic capacity. If this demand continues to grow it would not be improbable to see a Republic Company furnace join that of the Woodward Company, which is slated to go on basic in July. Movements are very heavy and stocks do not count. Even the warrant iron purchased several months ago by pipe and radiator manufacturers is moving out of the yards: This will about clean out the low-priced metal. While the market is undoubtedly stronger, prices are now more uniform. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.50 to $16.00
No. 2 foundry and soft	15.00 to 15.50
No. 3 foundry	14.50 to 15.00
No. 4 foundry	14.25 to 14.75
Gray forge	14.00 to 14.50
Basic	15.00 to 15.50
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—Pipe manufacturers are operating on a very satisfactory schedule, with a regular influx of orders and inquiries. Tentative arrangements with South America for a large business are hampered by lack of ships. J. R. McWane of the American Cast Iron Pipe Company is now in Buenos Ayres, to go thence to Rio Janerio, studying the South American situation. A considerable business will develop there as soon as shipping can be secured. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Every available beehive coke oven is being brought into requisition. All beehive foundry makes under $4 have disappeared. Furnace coke is selling at $3 to $3.50 per net ton at oven. Movements are hampered to some extent by a shortage of cars. Otherwise the coke situation is ideal. The Pacific sugar refineries are inquiring for a liberal tonnage. The Gulf States Steel Company has begun work on its Koppers by-product plant of 37 ovens at Gadsden, Ala. Coal is in better form than it has been in many months. Tonnage on the Warrior River through Lock 17, which was opened in May last, has increased from 895 tons in the first month to 15,000 tons in January and over 17,000 tons in February.

Old Material.—Dealers report a better business and a hardening in price. All kinds of steel scrap are in good demand and the volume of business is considerable. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	13.00 to 13.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.00 to 10.25
Tram carwheels	10.00 to 10.25
Stove plate	8.50 to 9.00

St. Louis

ST. LOUIS, MO., March 13, 1916.

Pig Iron.—Buying, heavy in the aggregate but made up largely of individual tonnages ranging from 1000 down, has been the feature of the market the past week. Total sales were probably 15,000 tons, while nearly half as much more is on inquiry and likely to be closed this week. In addition, negotiations are said to be on for 15,000 tons of basic for deferred delivery to a local consumer. The buying has been impartially divided between Northern and Southern, and all available deliveries have been included. There have been well-sustained reports of sales of warrant iron, a total of around 2500 tons No. 2 Southern at $15. Foundrymen are reported as coming more generally into the market and to be trying to contract ahead regardless of actual business on hand, having for the first time apparently realized that it was up to them to do something more than actual covering of closed contracts for castings.

Coke.—The troubles of the coke market continue accentuated, and the buying done is on a peremptory need basis and therefore well above the market. Local production of by-product coke is well sold up, and therefore not so serious an immediate competitor as in the past.

Finished Iron and Steel.—The demand for finished products is well sustained, with reports of large increase in building operations coming from the architects' offices. A number of large new buildings recently under contemplation are reported as having been determined on and specifications are looked for shortly. Fabricators report many new contracts and still others in prospect. The labor market is also reported very short of machinists, drill and lathe hands, blacksmiths, pattern makers and molders, indicating exceptional activity, while iron and steel plants generally are on the double-shift basis. In standard section steel rails the only transaction was a sale of 6 miles of 60-lb. Track fastenings are very active and transactions quite heavy, one of the best being 1200 kegs to the Wabash. Movement out of warehouse continues practically up to physical capacity at these quotations: Soft steel bars, 2.95c.; iron bars, 2.90c.; structural material, 2.95c.; tank plates, 3.20c.; No. 10 blue annealed sheets, 3.15c.; No. 28 black sheets, cold-rolled, one pass, 3.25c.; No. 28 galvanized sheets, black sheet gage, 5.35c.

Old Material.—The scrap market is sharply higher because of renewed demand from practically all industries, particularly the rolling mills and steel plants. The dealers, taking this development as confirmation of the position they have held in regard to the market,

have also bought heavily and the railroad lists of last report have all been closed out at good prices. Relayers are again very strong and are proving difficult to get. No new lists appeared during the week. We quote dealers' prices f.o.b. customers' works, St. Louis industrial district, as follows:

	Per Gross Ton	
Old iron rails	$17.00 to	$17.50
Old steel rails, rerolling	17.00 to	17.50
Old steel rails, less than 3 ft	16.75 to	17.25
Relaying rails, standard section, subject to inspection	22.00 to	23.00
Old carwheels	13.75 to	14.25
No. 1 railroad heavy melting steel scrap	16.00 to	16.50
Heavy shoveling steel	14.50 to	15.00
Frogs, switches and guards cut apart	16.00 to	16.50
Bundled sheet scrap	11.00 to	11.50

	Per Net Ton	
Iron angle bars	$16.50 to	$17.00
Steel angle bars	14.50 to	15.00
Iron car axles	21.50 to	22.00
Steel car axles	23.50 to	24.00
Wrought arch bars and transoms	19.00 to	19.50
No. 1 railroad wrought	15.75 to	16.25
No. 2 railroad wrought	15.25 to	15.75
Railroad springs	15.50 to	16.00
Steel couplers and knuckles	15.00 to	15.50
Locomotive tires, 42 in. and over smooth inside	17.00 to	17.50
No. 1 dealers' forge	13.00 to	13.50
Mixed borings	9.00 to	9.50
No. 1 busheling	13.50 to	14.00
No. 1 boilers, cut to sheets and rings	11.00 to	11.50
No. 1 railroad cast scrap	13.00 to	13.50
Stove plate and light cast scrap	10.00 to	10.50
Railroad malleable	12.00 to	12.50
Agricultural malleable	11.00 to	11.50
Pipes and flues	11.00 to	11.50
Railroad sheet and tank scrap	10.00 to	10.50
Railroad grate bars	10.00 to	10.50
Machine shop turnings	10.50 to	11.00

San Francisco

SAN FRANCISCO, CAL., March 7, 1916.

Distributive business shows a seasonable improvement. A general industrial revival is leading many small consumers to buy for work long held back, and the movement in ordinary channels promises to be the largest in several years. Slow deliveries, moreover, are inducing consumers who usually buy direct from the mills to purchase from stock, tending to keep merchants' supplies depleted. The scarcity of steel is already entailing considerable inconvenience in various quarters. The high prices are naturally a retarding factor, causing a very considerable volume of business to be withheld for the present, but much of the business now appearing is too urgent to be delayed on this account.

Bars.—The demand for reinforcing bars is increasing rapidly, and several large special orders are expected. The scarcity and high cost of shapes are turning considerable construction work to reinforced concrete. Manufacturers' requirements also are larger than usual, and specifications are very heavy. Local mills, though completing some of their Oriental contracts, are getting farther behind on domestic business, deliveries being five to six months off on some sizes. They are still getting about 2.75c., San Francisco, while for reasonably prompt shipment buyers are paying 2.75c., Pittsburgh, or more, the resale price on small lots being 3.75c.

Structural Material.—The February building record in several Pacific coast cities was the highest in several months, and many small contracts have been let. The figures submitted on more important work are evidently inducing some hesitation, and will probably bring extended delay on several office buildings, etc., though a number of large factory buildings and bridges are expected to go ahead shortly. Bids were opened March 6 for another large bascule bridge at Seattle, Wash., but the award is not yet announced. A church job at Menlo Park, Cal., about 250 tons, is reported let to the Central Iron Works. Plans have been accepted for a prison at Reno, Nev., in which there will be a lot of cell work. Some large bridge jobs in southern California are temporarily delayed. Miscellaneous manufacturing requirements are large, and a heavy tonnage is arriving on shipbuilders' contracts. Plain shapes in carloads from store are held at 3.40c., smaller lots being 0.25c. higher.

Rails.—Most orders of late have been for light rails, with a few sales of standard sections to logging interests. There is some expectation of buying by larger roads, but nothing definite has appeared so far. Negotiations for the Ocean Shore line have fallen through, and arrangements for refinancing the Western Pacific have been delayed.

Plates.—Large special inquiries are hardly so numerous as a few weeks ago, but there is still a strong demand for ship construction, and specifications from merchants and tank shops are very large. The Standard Oil Company will build three 46,000-bbl. tanks, three 30,000-bbl. tanks and some smaller tanks on a new storage site at Los Angeles Harbor. Slow deliveries have completely held up work on the Shell Company's plant near Martinez, Cal. The city of Seattle will take bids March 10 for a lot of 42-in. pipe, and the Los Angeles Mfg. Company has taken a large riveted pipe contract for the San Fernando irrigation system. A large tonnage will be needed to repair the San Diego water system, but the flood damage has not yet been completely surveyed. Buyers are paying about 3c., Pittsburgh, for reasonably early delivery, or 3.50c. for carloads from store, San Francisco.

Sheets.—The demand continues heaviest for blue annealed, the largest single orders being for pipe and tank work, though general manufacturing requirements are comparatively large. While arrivals on old contracts are quite heavy, stocks are kept pretty closely cleaned up. Supplies of galvanized also are light, though the demand is only normal, and there is little call for black sheets.

Wrought Pipe.—Merchants catering to the plumbing trade are now well stocked with pipe, as the consuming demand for the smaller butt-weld sizes has not been very heavy as yet. The jobbing movement, however, is increasing. Lap-weld pipe and casing continue quite active, and the oil-field outlook is most encouraging, as production has fallen considerably below the demand and a great deal of new development is projected.

Cast-Iron Pipe.—The city of Los Angeles has placed a contract for 2700 tons with the United States Cast Iron Pipe & Foundry Company, and Glendale, Cal., has ordered 400 tons of 20-in. A good many small orders for gas pipe are also coming in, and several new gas plants are projected at outside towns. Prices are firmly held as for several weeks past.

Pig Iron.—With both foundries and steel plants operating in a larger way than for several years, pig-iron requirements are quite heavy. The advance in scrap is leading to a larger use of pig iron for steel making, but this demand is mostly filled by Chinese iron, a large shipment of which was received a few days ago. Southern iron is arriving in large quantities on old contracts, and many new orders for early as well as extended shipment are being booked at the former price of $27 per gross ton for No. 1 foundry.

Coke.—Very little coke has arrived in the last few months, either for foundry or smelter use, and requirements for both purposes are unusually large. A considerable tonnage has been coming from the Southwest and Rocky Mountain region, going mostly to the smelters. Most local foundries are now using Eastern and Southern coke, which is moving freely at $16 to $17 per net ton. Shipments are coming through in good time.

Old Material.—Prices show considerable firmness, as the local demand for steel melting scrap is larger than ever before, and the largest and most conspicuous offerings in this vicinity have been pretty well cleaned up. With further large additions being made to open-hearth capacity, dealers look for a shortage and are inclined to take an extreme view in regard to prices. Against this it may be said that there is still a very large scattered tonnage lying untouched in the country, much of which should be available at present prices, which range from $8 to $13 per gross ton. Cast-iron scrap is in ample supply, but is moving more freely than for some time, being held as a rule around $14 to $15 per net ton.

Boilermakers and helpers employed in and around San Francisco are threatening to strike, demanding a minimum of $4 per day for new work or $4.50 for old work, with $3 minimum for helpers.

The Pacific Coast Steel Company has about completed a second open-hearth furnace and some other equipment at its Seattle plant, and will start up the new additions this month. The projected plant at Portland will not be started until the completion of improvements at the South San Francisco mill, which will take two or three months. The Portland plant will include two open-hearth furnaces and two or three trains of rolls, the output to consist of bars and small shapes.

George W. Pennington Sons, Inc., San Francisco, Cal., manufacturer of forgings, announces that its office has been removed to its works at Montgomery and Chestnut streets.

New York

NEW YORK, March 15, 1916.

Pig Iron.—The market has been more active than at any time in weeks. Both inquiries and sales are large. Probably 50,000 to 60,000 tons has been sold through local offices in the past week. Deliveries represent all sorts and conditions. Much of the iron bought is for second-half delivery, but in other cases deliveries begin at once and run through the year, or they represent second quarter or second quarter and second half, or in a few cases extend into 1917. Buffalo prices are higher and $18.50 is probably minimum on 2.50 silicon iron, while on late-in-the-year deliveries $18.75 for iron of that analysis has been refused. Sales in the East have been in a number of cases at $19, Buffalo furnace, for No. 2 X foundry and malleable irons. Inquiries pending amount easily to 40,000 tons. A Connecticut malleable interest is in the market for 5000 to 8000 tons, and a large maker of textile machinery castings in New England is inquiring for a round block of iron. Charcoal iron has been taken in good-sized quantities by several melters and there are inquiries for basic iron, including one of 6000 tons for New England. One New Jersey inquiry is for 400 tons a month of Bessemer iron, June to September delivery. Canadian foundries are inquiring for Buffalo iron, but at $19 at furnace with $2.80 duty, plus 7 per cent ad valorem war duty, the price is running up pretty well on Canadian foundries. In eastern Pennsylvania one producer is now asking $20 at furnace for No. 2 X and another company has put its price at $21 at furnace for the last half. Pipe iron sales in Virginia have been heavy and a New York soil pipe interest is inquiring for 3000 to 5000 tons. Some sellers are asking higher prices for forward than for nearby deliveries, while others are willing to sell at to-day's prices for delivery running through the first quarter of 1917. We quote at tidewater as follows for early delivery. No. 1 foundry, $20.50 to $21; No. 2 X, $20.25 to $20.75; No. 2 plain, $20 to $20.50; Southern iron at tidewater, $20.50 to $21 for No. 1 and $20 to $20.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—The market is quiet considering the conditions. While the quotation for ferromanganese is $175, seaboard, for forward delivery, this is nominal, as most British representatives are out of the market at present. Any one of them may, however, receive notice at any time to sell a limited tonnage, but with no guarantee as to delivery, which is likely to be not before 1917. Spot material is very scarce, though a few carloads are reported sold in a nearby Eastern territory at $350 per ton. A 50 per cent manganese alloy, by some called ferromanganese, by others speigeleisen, has sold at $4 per unit. Speigeleisen proper, 19 to 21 per cent manganese, has been advanced $10 per ton to $60 for delivery in the last half, but the supply is not large. Receipts of British alloy in February are now known to have been larger than expected though domestic production was considerably below the monthly average for 1915. Ferrosilicon, 50 per cent, is in the usual strong demand though the supply is gradually increasing. At least 5000 tons of ferromanganese has been sold in the last week at $175, for delivery in the first half of 1917.

Structural Material.—The question whether the continued advance in shapes is to seriously curtail building projects and the general demand for fabricated steel is answered at present by the fact that inquiries continue large and the tonnage placed is satisfactory. It is granted that some large projects have been withdrawn or postponed, but others take their place and maintain the volume of business. Many projects are regarded as sure to be prosecuted no matter what the cost. Shapes and plates for fabricating were advanced yesterday by the leading interest to 2.35c. and 2.60c., Pittsburgh, respectively, an increase of $2 per ton for the former and $5 per ton for the latter. Further advances are expected soon. Fully 7000 tons of steel for loft buildings and 12,000 to 13,000 tons of steel for railroad bridge work are before the market besides about 20,000 tons of other projects. The bridge work up for bids, besides the 6500 tons involved in the Chesapeake & Ohio approach bridge at Cincinnati, Ohio, includes 2400 tons for two piers for the Norfolk & Western, 350 tons for 25 small bridges for the New York Central, 200 tons for 4 small bridges for the New York, New Haven & Hartford, 2500 tons for Baltimore & Ohio bridges, as well as several small bridges for the Boston & Maine and others. The Chicago, Burlington & Quincy is asking for bids on 2600 tons for shops at Burlington, Iowa, and there has been no decision on the 6000 to 8000 tons involved in the caisson for the bridge for the New York, New Haven & Hartford over the Thames River at New London, Conn. Other inquiries reported comprise 1100 tons for several Cuban sugar mills; 200 tons for buildings for the Mexican Petroleum Company, Mexico; 150 tons for a warehouse at Meriden, Conn., and 150 tons for 16 signal bridges for the New York Central at Rochester, N. Y. New contracts let include 2000 tons for a 12-story loft for Frederick Ayre, New York, to the Hay Foundry & Iron Works; 1300 tons to the same fabricator for the Bloomingdale Bros. store, New York; 450 tons to an independent shop for two city bridges, and two Pennsylvania bridges at Philadelphia; 800 tons to the Hedden Iron Construction Company for the Corn loft at Sixteenth Street and Union Square; 600 tons to the Passaic Steel Company for a mercantile building at 509 Fifth Avenue; 450 tons to the Eastern Steel Company for a building for the Carpenter Steel Company; 600 tons to the Chesapeake Iron Works for the Hutzler store, Baltimore; 600 tons to an independent shop for a bridge over the barge canal for the Lehigh Valley at Rochester, N. Y.; 1000 tons to the American Bridge Company for a railroad bridge for the Baltimore & Ohio at Defiance, Ohio; 1000 tons for a mill building at New Bedford, Mass., and 300 tons for a connection between the elevated tracks on Queensboro bridge and the Second Avenue Elevated Railroad, New York, both to the American Bridge Company. The Jones & Laughlin Steel Company has taken 200 tons for the power house extension for the Ingersoll-Rand Company at Painted Post, N. Y., while a general contractor has taken 250 tons for a bridge over the barge canal at Little Falls, N. Y., the steel having gone to an independent fabricator. The United States Metal Refining Company, Chrome, N. Y., has awarded 650 tons for a building to an independent fabricator. The Eastern Steel Company is reported to have taken 500 tons for an addition to the Victor Talking Machine Company, Camden, N. J., while Milliken Brothers are said to be low bidders for 500 tons for the Arena Building at Springfield, Mass. Post & McCord were the low bidders for rebids on 4200 tons for a structural steel pier shed at Forty-sixth Street and North River, Snare & Triest being second. We quote mill shipments at 2.519c., New York, and buying out of store at 3.10c., New York, an advance of $3 per ton in the last week.

Plates.—The announcement late last week by the leading interests of a quotation of 2.75c. for plates, 2.50c. for shapes and 2.35c. for bars for vessel and car material for delivery in 1917 has been disregarded by Eastern mills. Without exception they decline to consider any business so far ahead and refuse to contract for any period even in 1916. Sales are made for delivery at

the convenience of the mill and the minimum on plates has been advanced in every case but one to 3.50c., base, Pittsburgh. Sales have been made at this price for delivery as late as the third quarter. Much earlier delivery on small lots has brought as high as 3.75c. and 4c., with 4.25c. asked. One mill is still selling at 3.25c. for third quarter and it was a surprise to the trade to learn that a Middle Western steel maker had sold recently in New York 900 tons of plates at 2.75c. for fairly early delivery. The demand is large, not so much directly in this district as that caused by the pressure on the mills from other centers. Car orders are numerous, especially foreign ones, as indicated in another column, though domestic demand in particular has abated somewhat. Quotations depend on the conditions pertaining to each case, but we quote 3.25c., Pittsburgh, or 3.419c., New York, for prompt shipment. Prices for plates out of store, New York, were advanced yesterday to 4c.

Iron and Steel Bars.—The steel-bar mills continue well sold up, but the nominal quotation has been advanced to 2.35c., Pittsburgh, or an increase of $2 per ton. Specifications on contracts are up to the limit and large orders continue to be offered. Inquiries from the agricultural implement makers are appearing in volume as covering their needs for last half, but it is understood that no quotations have been offered or decided on yet. Iron-bar business is made more active because of the excessive demand for steel bars, this situation extending to foreign orders. The nominal New York quotation for steel bars is 2.519c. with higher prices not unexpected and easily obtained for early delivery. Iron bars are still 2.569c., New York, with the warehouse prices are now 3.10c. for both iron and steel bars.

Cast-Iron Pipe.—The Department of Water, Gas and Electricity of the City of New York opens bids this Thursday, March 16, on 1230 tons of 4 to 20-in. pipe and 60 tons of fittings, delivered and piled in the city yards in Brooklyn. The same department on March 20 will open bids on two contractors' jobs for the borough of Richmond (Staten Island), one of which involves the purchase of 85 tons of pipe and 5 tons of fittings, and the other 430 tons of pipe and 15 tons of fittings. The United States Cast Iron Pipe & Foundry Company was lowest bidder on the Atlantic City contract for 2500 tons of pipe for high-pressure service. Inquiries keep up well, and private buying is of good volume. Carload lots of 6-in., class B and heavier, are still quoted at $29.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton over class B.

Old Material.—The market has been decidedly strengthened by the heavy demand for old material in western Pennsylvania. Embargoes are still in force on shipments to various points in eastern Pennsylvania so that the local market is somewhat out of touch with conditions in that section. It is understood that considerable quantities of heavy melting steel scrap and rolling-mill stock, as well as borings and turnings for blast-furnace use, have been sold for shipment to western Pennsylvania. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap	$15.50 to $16.00
Relaying rails	23.50
Rerolling rails	16.50 to 17.00
Iron car axles	25.50 to 26.00
Steel car axles	25.50 to 26.00
No. 1 railroad wrought	20.50 to 21.00
Wrought-iron track scrap	18.00 to 18.50
No. 1 yard wrought, long	16.50 to 17.00
No. 1 yard wrought, short	15.50 to 16.00
Light iron	7.50 to 8.00
Cast borings (clean)	8.75 to 9.00
Mixed borings and turnings	8.00 to 8.25
Wrought pipe	12.50 to 12.75
Old carwheels	14.50 to 15.00
Malleable cast (railroad)	12.75 to 13.25

The foundry demand keeps up well, but prices are unchanged. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$17.50 to $18.00
No. 2 cast (heavy)	15.50 to 16.00
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

British Market Unsettled

Pig Iron and Billets Scarce—Business Hampered by Uncertainties

(*By Cable*)

LONDON, ENGLAND, March 15, 1916.

Business is greatly hampered owing to the uncertainty regarding government regulations. No pig iron is available, makers being unwilling sellers. Hematite iron stands at 140s., and tin plates are strong at 29s. 6d. to 30s., with makers mostly holding off. Increasing working difficulties are causing uneasiness with tin plate business reported for home trade at 30s. English billets are nominal and American open-hearth 4-in. material is quoted at $55 to $57 for April and May shipment. Quotations, mostly nominal, on some products are:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 29s. 6d. to 30s., against 28s. to 28s. 6d., last week.

Cleveland pig-iron warrants, 85s. 6d., compared with 85s. 4½d. last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20, nominal.

Steel ship plates, Scotch, delivered local yards, £13 5s.

Steel rails, export, f.o.b. works, port, £11.

Hematite pig iron, f.o.b. Tees, about 135s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £13 10s.

Steel bars, export, f.o.b. Clyde, £17 5s.

Ferrosilicon, 50 per cent, c.i.f., £27.

The St. Louis Blast Furnace

With the vacation March 10 by the city of four paper streets intersecting property optioned by the Mississippi Valley Iron Company, at St. Louis, the company began March 13 the equipment and rehabilitation of the old St. Louis blast furnace, involving a cost of about $500,000. President Edward F. Goltra is in charge of the work. The organization of the company was recently reported in THE IRON AGE. William Bagnell, J. D. Dana and David R. Francis are among the large stockholders. The company is stated to be amply equipped financially, with plans for the ultimate expenditure of a total of about $1,000,000 on the plant. It owns ore bodies near Waukon, Iowa, and also in the Southwest. Daniel Bonticue, formerly in charge of blast furnaces at Chicago, will supervise the construction and operation of the plant under President Goltra.

Chain Again Advanced

Effective Tuesday, March 14, prices of chain were again advanced $10 per ton, or from $4.50 to $5 per 100 lb. for ⅜ in. Prices now in effect, f.o.b. Pittsburgh, are as follows: Straight link, proof coil, self colored or blacked, 3/16 in., $9.10; ¼ in., $6.55; 5/16 in., $5.55; ⅜ in., $5; 7/16 in., $4.85; ½ and 9/16 in., $4.70; 15/16 in., $4.40; 1 in., $4.20; 1-1/16, 1⅛ and 1¼ in., $4.30. Extras to be added to proof coil chain prices per 100 lb., twisted link coil, 3/16 to 7/16 in., inclusive, 25c.; bright coil chain, 25c.; B. B. quality, 3/16 and ¼ in., $1.25; 5/16 in. and larger, $1; B. B. B. quality, 3/16 and ¼ in., $1.75; 5/16 in. and larger, $1.50.

Metal Trades Convention

Following is the program for the approaching convention of the National Metal Trades Association, to be held April 25 to 28 at the Hotel Astor, New York:

Tuesday, April 25.—Executive Committee Meeting.

Wednesday.—Administrative Council Meeting and Alumni Banquet.

Thursday.—Convention and General Banquet.

Friday.—Convention and Buffet Luncheon.

The city of St. Louis, Mo., through its Public Service Commission, has rejected bids for iron and steel pipe for high pressure water service, the figures being $246,166 by the East Jersey Pipe Company for steel pipe and $281,829 by the United States Cast Iron Pipe & Foundry Company for cast-iron pipe, alternative bids having been sought. The ground for rejection was that the prices asked were too high.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb. New York, 16.9c. Phiadelphia, 15.9c. Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 2.75c. to 3c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive.	.50
Cutting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Rods.—Bessemer, open-hearth and chain rods, $55, nominally.

Wire Products.—Prices to jobbers, effective Feb. 29: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.25; galvanized, $2.95. Galvanized barb wire and staples, $3.25; painted, $2.55. Wire nails, $2.40. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.30	$2.35	$2.40	$2.45	$2.60	$2.70	$2.80	$2.90
Galvanized	3.20	3.25	3.30	3.35	3.40	3.55	3.90	4.00

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from March 15, 1916, on black and galvanized steel and iron pipe, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	66	35½	⅛ and ¼	55	24
½	70	51½	⅜	56	28
¾ to 3	73	55½	½	60	38
			¾ to 1½	63	43
			2	62	42

Lap Weld

2	69	51½	1¼	47	27
2½ to 6	72	54½	1½	58	38
7 to 12	68	49½	2	59	40
13 and 14	58½	..	2½ to 4	61	43
15	56	..	4½ to 6	61	43
			7 to 12	59	41

Reamed and Drifted

1 to 3, butt	71	53½	1 to 1½, butt	61	41
2, lap	67	49½	2, butt	60	40
2½ to 6, lap	70	52½	1¼, lap	45	25
			1½, lap	56	36
			2, lap	57	38
			2½ to 4, lap	59	41

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	62	40½	⅜	55	34
½	67	50½	½	60	43
¾ to 1½	71	54½	¾ to 1½	64	45
2 to 3	72	55½	2 and 2½	64	47

Lap Weld, extra strong, plain ends

2	67	50½	1½	58	41
2½ to 4	70	53½	2	61	43
4½ to 6	69	52½	2½ to 4	63	46
7 to 8	64	45½	4½ to 6	62	45
9 to 12	59	40½	7 to 8	55	38
			9 to 12	50	33

Butt Weld, double extra strong, plain ends

½	58	43½	½	47	31
¾ to 1½	61	46½	¾ to 1½	50	34
2 to 2½	63	48½	2 and 2½	51	35

Lap Weld, double extra strong, plain ends

2	59	44½	2	48	31
2½ to 4	61	46½	2½ to 4	50	36
4½ to 6	60	45½	4½ to 6	48	34
7 to 8	54	35½	7 to 8	41	24

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.85 to 2.95
Nos. 9 to 10	2.90 to 3.00
Nos. 11 and 12	2.95 to 3.05
Nos. 13 and 14	3.00 to 3.10
Nos. 15 and 16	3.10 to 3.20

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.55 to 2.65
Nos. 22 and 24	2.60 to 2.70
Nos. 25 and 26	2.65 to 2.75
No. 27	2.70 to 2.80
No. 28	2.75 to 2.85
No. 29	2.80 to 2.90
No. 30	2.90 to 3.10

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.75 to 4.00
No. 12	3.85 to 4.10
Nos. 13 and 14	3.85 to 4.10
Nos. 15 and 16	3.95 to 4.20
Nos. 17 to 21	4.10 to 4.35
Nos. 22 and 24	4.30 to 4.55
Nos. 25 and 26	4.45 to 4.70
No. 27	4.60 to 4.85
No. 28	4.75 to 5.00
No. 29	4.90 to 5.15

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes, in effect from March 15, 1916, and standard charcoal-iron tubes, effective from Feb. 29, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	40	1½ in.	37 to 38
1¾ and 2 in.	52	1¾ and 2 in.	41 to 42
2¼ in.	49	2¼ in.	38 to 39
2½ and 2¾ in.	55	2½ and 2¾ in.	45 to 46
3 and 3¼ in.	60	3 and 3¼ in.	49 to 50
3½ to 4½ in.	61	3½ to 4½ in.	51 to 52
5 and 6 in.	54	5 and 6 in.	45 to 46
7 to 13 in.	51		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
Mar.	Lake	lytic	York	York	Louis	York	Louis
8	27.00	26.50	50.00	6.70	6.75	19.25	19.00
9	27.00	26.25	54.00	6.80	7.00	18.75	18.50
10	27.00	26.12½	56.00	6.85	7.12½	18.25	18.00
11	27.00	26.12½	55.50	6.90	7.12½	17.75	17.50
13	27.00	26.25	54.00	6.90	7.25	16.50	16.25
14	27.00	26.37½	54.00	7.25	7.37½	16.75	16.50

NEW YORK, March 15, 1916.

The lead market has gone beyond all restraint. For shipment to the Pacific coast, on Japanese account, 8c. has been bid, while St. Louis quotes higher than New York. Copper has remained dull, but has a better tone than prevailed late last week. The scarcity of spot tin sent its price to 56c., but the market is now a little easier. Spelter has declined steadily in a dull market, but the bottom is believed to have been reached. Antimony continues strong at unchanged quotations.

New York

Copper.—The market has been continuously dull, and in the latter part of last week concessions of about ¼c. were made by second hands, although large quantities were not available at the lower price. This week the market has gained strength but business shows no improvement. Electrolytic could have been had yesterday, June or July delivery, at 26.37½c., cash, New York. Lake is nominal at 27c., cash. Consumers are comfortably covered for their nearby needs, and what demand there is, is for the far off positions. The dull state of the market dates back to the recent strike at the Ansonia brass mills which gave consumers a fright from which they apparently have not recovered. The dullness has been intensified by the railroad freight congestion in New England which held up deliveries to the mills. The exports this month up to and including yesterday total 6833 tons.

Tin.—The scarcity of spot metal in this country and the great difficulty experienced in obtaining licenses to ship from London have been the controlling factors of the market for several days. Last Thursday the situation became acute and on that day probably 500 tons was dealt in. Early in the day 52c. was quoted but later 56c. was paid. Independent makers of tin plate were the chief buyers. The quotation yesterday was 54c. Brokers have been unwiling to sell until they saw the way clear to replace metal they disposed of, inasmuch as they have contracts to meet. Much depends on the arrival of the steamer Suruga from Singapore with 1135 tons. She will not arrive until near the end of the month and it is a question if the tin she carries will be available for March delivery. Buyers are eager to buy deliveries which are certain and will pay enhanced prices, but great uncertainty seems to prevail both as regards shipments and arrivals. The market this week has been quiet. The arrivals this month total only 368 tons. There was afloat yesterday 6735 tons.

Lead.—The efforts of the leading producers to halt the lead market and prevent a runaway were without avail, and to-day it is exceedingly difficult to tell just where prices are. The American Smelting & Refining Company advanced its New York quotation yesterday to 7c., but this is a nominal price. The company is selling very little metal and then only to regular customers. When it was asked to quote on a forward position its reply was that it would take the business on condition that the average price for the month named be paid. The New York market has been excited, with both domestic and foreign buyers clamoring for the little spot lead to be had. Sales were made last week at 7c., f.o.b. St. Louis; later there were bids of 8c., delivered Pacific coast, for shipment to Japan. Interests on the coast have been buying all the lead they can find for shipment to China and Russia, as well as to Japan. In some cases sellers have refused 8c. on this business. The average of quotations yesterday was 7.25c., New York, and 7.37½c., St. Louis. The exports this month, including yesterday, total 1678 tons.

Spelter.—The market has been extremely dull, and prices have declined steadily but it is believed that the bottom has been reached. The quotation yesterday was ¼c. stronger at 16.75c., New York, and 16.50c., St. Louis. April and May were quoted at 16c., St. Louis, and June at 15c. The London market declined £8 to £85 Monday, but is now steadier.

Antimony.—The quotations for Chinese and Japanese grades are firm at 44c. to 45c., duty paid. March shipments from the East are quoted at 34.50c., in bond. A good business has been done in futures.

Aluminum.—This metal is easier at 57c. to 60c., for No. 1 virgin, 98 to 99 per cent pure, spot shipments.

Old Metals.—Consumers display little interest in the market. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	25.00 to 26.00
Copper, heavy and wire	24.00 to 25.00
Copper, light and bottoms	20.00 to 21.00
Brass, heavy	15.00 to 15.50
Brass, light	12.50 to 13.00
Heavy machine composition	18.00 to 19.00
No. 1 yellow rod brass turnings	16.00 to 16.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	5.75
Lead, tea	5.25
Zinc	14.00 to 15.00

Chicago

MARCH 13.—The advancing quotations for tin and lead contrast with a slump in spelter. Copper quotations are about as last noted. We quote: Casting copper, 27.50c.; Lake copper, 28.50c.; tin, carloads, 56c., and small lots, 58c.; lead, 7.25c.; spelter, 16c. to 16.50c.; sheet zinc, 25c.; Cookson's antimony, 50c.; other grades, 48c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 23½c.; copper bottoms, 21c.; copper clips, 22c.; red brass, 19.50c.; yellow brass, 15c.; lead pipe, 6c.; zinc, 14.75c.; pewter, No. 1, 26c.; tinfoil, 36c.; block tin pipe, 40c.

St. Louis

MARCH 13.—Metals are quotable to-day as follows: Lead, 8c.; spelter, 16.25c.; tin, 59c.; Lake copper, 30c.; electrolytic copper, 29.50c.; antimony, Asiatic, 49c. In the Joplin ore district the top price of zinc blende, basis of 60 per cent, was $100 per ton, ranging down to $80, with premium grades selling at about $105. Calamine ranged from $70 to $80. Lead ore rose to $90, basis of 80 per cent metal, the highest price ever paid in the district. The average of the week's tonnage of the entire district was as follows: Zinc blende, $90; calamine, $73; lead, $89. On miscellaneous scrap metals buying prices are quoted as follows: Light brass, 10.50c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 16c.; heavy copper and copper wire, 19c.; zinc, 12c.; lead, 5.50c.; pewter, 24c.; tinfoil, 32c.; tea lead, 3.50c.

The Snyder Electric Furnace Company, Chicago, recently added to its staff of metallurgical engineers Robert M. Keeney, who will be in charge of all development work. He has had a broad experience in electric furnace research, his work having been especially directed toward the production of ferroalloys and electric smelting. In this connection he visited many electric furnace plants in Sweden, England, France and Germany. As metallurgist of the Standard Chemical Company, Canonsburg, Pa., he was engaged in the production of ferrovanadium and developed a process for the manufacture of ferrouranium.

The St. Louis Car Company, St. Louis, Mo., in its wood-working department, has undertaken the construction of war aeroplanes for Great Britain and will make its first shipment of 12 about March 25. The capacity of the department will be occupied with this type of work for some time. The planes cost $11,500 each and are built to carry six pasengers.

Iron and Industrial Stocks

NEW YORK, March 15, 1916.

The stock market appears to be recovering from its lethargy. International complications have grown much less threatening, and favorable trade developments are having a direct effect in the advancement of quotations. The industrial stocks have been strong and some of them have risen spectacularly. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	29¼ - 33⅞	Ry. Steel Spring, pref.	95¼ - 96½
Allis-Chal., pref.	77½ - 81	Republic com.	50⅞ - 54½
Am. Can, com.	58¾ - 63⅞	Republic, pref.	111⅜ - 112
Am. Can, pref.	111⅛ - 112⅜	Sloss, com.	55 - 58½
Am. Car & Fdy., com.	67 - 75⅝	Sloss, pref.	97½
Am. Car & Fdy., pref.	119½	Pipe, com.	18 - 26½
Am. Loco., com.	68⅝ - 83¾	Pipe, pref.	49 - 52
Am. Loco., pref.	101¾ - 104	U. S. Steel, com.	82 - 86⅞
Am. Steel Fdries.	48½ - 55½	U. S. Steel, pref.	116¼ - 117
Bald. Loco., com.	103¼ - 113½	Va. I. C. & Coke	52 - 54
Bald. Loco., pref.	109 - 109¼	Westg. Electric	63⅛ - 69¾
Beth. Steel, com.	477 - 550	Am. Rad., com.	395
Beth. Steel, pref.	132 - 135	Am. Ship, com.	39¾ - 47⅞
Case (J. I.), pref.	85	Am. Ship, pref.	85¼ - 87
Colorado Fuel	41 - 47½	Chic. Pneu. Tool	67 - 71
Deere & Co., pref.	94½ - 95	Cambria Steel	81 - 81½
Gen. Electric	169 - 173½	Lake Sup. Corp.	10⅜ - 11⅝
Gt. No. Ore Cert.	42 - 46¼	Pa. Steel, com.	70
Int. Harv. of N. J., com.	109½ - 110	Pa. Steel, pref.	98¼ - 98½
Int. Harv. Corp., com.	68⅛ - 70	Warwick	10½ - 10¾
Lackawanna Stl.	75⅛ - 81⅛	Cruc. Steel, com.	78¼ - 96½
Nat. En. & Stm., com.	25 - 27¼	Cruc. Steel, pref.	113½ - 117½
Nat. En. & Stm., pref.	97	Harb-Walk. Refrac., com.	83½ - 84
N. Y. Air Brake	141 - 150	Harb-Walk. Refrac., pref.	102
Pitts. Stl., pref.	94½	La Belle Iron, com.	50 - 51⅛
Pressed Stl., com.	51½ - 58	La Belle Iron, pref.	129 - 130½
Pressed Stl., pref.	102¼	Carbon Stl. com.	69 - 75
Ry. Steel Spring, com.	38⅛ - 44¼	Driggs-Seabury	138 - 144
		Midvale Steel	62¾ - 69¾

Dividends

The Trumbull Steel Company, regular quarterly, 1¾ per cent on the preferred and initial quarterly, 1½ per cent on the common stock, payable April 1.

The American Iron & Steel Mfg. Company, regular quarterly, 1¼ per cent each on the preferred and common stocks, payable April 1.

The Standard Screw Company, extra, 6 per cent on the common stock, payable April 1.

The Dominion Iron & Steel Company, semi-annual, 3½ per cent on the preferred stock, payable April 1. This is the first dividend since April 1, 1914.

The Colt's Patent Fire Arms Mfg. Company, regular quarterly, 2½ per cent and extra, 10 per cent, payable April 1.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1¾ per cent on the preferred stock, payable April 1.

The Willys-Overland Company, regular quarterly, 1¾ per cent on the preferred stock, payable April 1.

The Gould Mfg. Company, quarterly, 1½ per cent on common and 1¾ per cent on preferred, payable April 1.

The Brier Hill Steel Company, regular quarterly, 1¾ per cent on the preferred and 1½ per cent on the common stock, payable April 1.

The American Car & Foundry Company, regular quarterly, 1¾ per cent on the preferred stock and ½ of 1 per cent on the common stock, payable April 1.

The J. I. Case Threshing Machine Company, regular quarterly, 1¾ per cent on the preferred stock, payable April 1.

The Western Electric Company, regular quarterly, 1½ per cent on the preferred stock and 2 per cent on the common stock, payable March 31.

The American Shipbuilding Company has booked orders for three additional boats of the Welland Canal size for the Atlantic coast trade. Two of these are for the Mallory interests in New York, making four steamers that have been placed with this shipbuilding company by these interests. The American Shipbuilding Company now has 26 vessels under contract for delivery in 1916 and 1917. Nine of these are for the Lake trade and 17 are ocean vessels. All of the large berths at the Lake yards for early delivery in 1917 have been taken.

The Cincinnati Iron & Steel Company, Cincinnati, Ohio, has just received an order from Russia for a great many Simplex lathes for use in making 3-in. shells. They will be delivered in April and May.

STEEL COMPANIES INDICTED

Youngstown Grand Jury Findings in Aid of Politicians and Strike Leaders

The grand jury which has been at work at Youngstown, Ohio, on the riots of Jan. 7 in connection with strikes at the plants of the Republic Iron & Steel Company and the Youngstown Sheet & Tube Company, made its report last week after a session of 39 days. Indictments were filed against the United States Steel Corporation and its chairman, Elbert H. Gary, and against the Youngstown Sheet & Tube Company, the Republic Iron & Steel Company, the Brier Hill Steel Company, the Youngstown Iron & Steel Company and Carnegie Steel Company. The report says that 562 witnesses were examined and that the indictments returned are against 114 persons and corporations which the grand jury professes to believe had to do with the riots. The report says that "great dissatisfaction existed among the men employed by the various steel industries of the Mahoning Valley" and mysteriously refers to "an underlying cause back of not only the strike and the dissatisfaction prevailing among the men prior to the strike but of the riot itself." Incidentally the mayor of East Youngstown is blamed for the fact that the members of the mob became intoxicated before committing their depredations. The steel companies are indicted under the Valentine law, the so-called anti-trust statute of Ohio, and are charged with a conspiracy to regulate prices of steel and iron products and keep down wages of unskilled or common laborers. The defendants are accused of fixing a uniform rate of wages to be paid to common labor.

The prosecuting attorney at Youngstown who secured the indictments is said to have explained that the fact that wages were increased at Youngstown by the other companies immediately after the announcement of an increase at the beginning of this year, by the Steel Corporation, indicates an agreement among the companies as to the rate of wages. Officers of the companies indicted have made public statements in the past week to the effect that there are no facts justifying the indictments and that there was no understanding between the companies on the question of wages. The whole proceeding is looked upon as a political move and as an indication of the influence of a type of labor leaders.

On behalf of the Steel Corporation it is stated that no reduction in wages has been made since Jan. 1, 1904. The amount of that reduction was restored on April 1, 1905. Since the latter date increases have been made as follows: On Jan. 16, 1910, by 6¼ per cent; on Feb. 19, 1913, by 10 per cent, and on Feb. 1, 1916, by 10 per cent.

Germany's Steel Output in 1915

Germany's steel production for 1915 was 13,187,616 metric tons, according to the figures of Association of Iron and Steel Producers. This compares with 14,946,212 tons in 1914 and with 18,958,819 tons in 1913, the record year. The output of 1915 is not much less than that of 1909, which was 13,698,638 tons. The production for the first twelve months of the war was 11,355,841 tons.

The December production was 1,162,895 tons, or 44,726 tons a day, which compares with the record war rate of 47,498 tons in October. The December output was made up as follows: Bessemer steel ingots, 582,340 tons; open-hearth ingots, 491,914 tons; steel castings, 66,334 tons; crucible steel, 7733 tons; electric steel, 14,574 tons. The December electric steel output is second only to that of 14,952 tons in October, the record production in peace or war times.

Swedish pyrite is reported to have been contracted for by German buyers on the basis of about $1230 per ton for copper and 28c. per unit for sulphur, payment to be made in German currency. The copper content is about 2.50 per cent and the sulphur about 49 per cent.

Pittsburgh and Nearby Districts

The monthly meeting of the Pittsburgh Foundrymen's Association, to be held in the Fort Pitt Hotel on Monday evening, March 20, will be an anniversary meeting. The association was organized in 1896, or 20 years ago, and has had a successful career. The anniversary meeting will be preceded by a dinner, addresses will be made by men of prominence and a musical and vaudeville entertainment will follow.

The Brier Hill Steel Company, Youngstown, Ohio, has contracted to sell the tar products from its 84 Koppers by-product coke ovens to the Barrett Company, which has also arranged to take the tar products from the 204 Koppers by-product ovens now being built by the Youngstown Sheet & Tube Company. The Barrett Company is planning the erection of a plant in Youngstown for the handling of this material, from which it will produce carbolic oil, paving pitch, creosote oil and light coal oils. From the latter in turn are manufactured explosives and dyestuffs. The proposed plant will be erected by W. B. Young, Youngstown, to whom the contract was recently awarded. It will cost about $200,000 and employ about fifty men.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has sold to the National Tube Company, Pittsburgh, the electrical equipment to drive a new 40-in. blooming mill to be installed in its plant at Lorain, Ohio. This blooming mill, when completed, will be one of the largest in the country. The reversing motor will develop 15,000 hp. and will run at a maximum speed of about 120 r.p.m. The power for the reversing motor will be supplied by a flywheel motor generator set, which will be so controlled that the load on the power plant will be limited to approximately 3000 kw. One of the novel features of this equipment is the arrangement made to allow the reversing motor to be turned over slowly for setting up the mill without running the flywheel motor generator set. A sale of a similar equipment has been made to the Indiana Steel Company for driving a new 40-in. reversing blooming mill to be installed in its plant at Gary, Ind. The capacity of the reversing motor will be 15,000 hp. and will be supplied with power by a flywheel motor generator set. In addition to these two units, the Westinghouse Company is building the electrical equipment for four other reversing mills, two of which are of approximately the same size as those given above. The Westinghouse Company has also sold to the Narragansett Electric Light Company, Providence, R. I., a turbine-generator unit of 45,000-kw. capacity, divided into a high and low pressure element, and weighing approximately 1,500,000 lb., being one of the largest units of its kind ever constructed.

The Petroleum Iron Works Company and the Standard Steel Tank Company, both of Sharon, Pa., have received recently very heavy orders for tankage and refinery work for the Texas oil fields. The plants of both companies are operating to their utmost capacity.

More than 20 miles of genuine wrought-iron pipe, made by the A. M. Byers Company, Pittsburgh, was used in building the new William Penn Hotel in that city, which opened last week.

At the bi-monthly examination of sales sheets on common iron bars, sheets and tin plate for January and February, made in Youngstown, Ohio, last week, it was found that the average price on shipments of common iron bars for January and February was 1.40c., entitling the puddlers to an advance from $6.20 to $6.60 per ton and muck rollers and heaters corresponding advances for March and April. The average price of No. 28 gage black sheets was 2.25c., entitling the men to an advance of 7 points, or about 7 per cent in wages for March and April. Tin mill hands will also receive an advance for March and April of 3 points, or about 3 per cent.

Owing to the rapid growth of its business, the Carbon Steel Company, Pittsburgh, has been compelled greatly to increase its output, and for this purpose has leased for an indefinite period and will operate a part of the plant of Moorhead Brothers & Co., Inc., Sharpsburg, Pa. It contains a 20 and 16 in. bar mill and a 100-in. plate mill, and it is the intention of the Carbon Company to make the steel blooms in its own plant and take these to the Moorhead works for rolling. The Carbon Company has bought about 3½ acres adjacent to its present plant at Thirty-second and Smallman streets, Pittsburgh, to be used for extensions, the nature of which will likely be decided upon in the near future.

Hubbard & Co., Pittsburgh, makers of shovels, spades and scoops, have awarded a contract to the Samuel Austin & Son Company, Cleveland, Ohio, for a reinforced concrete building, 80 x 480 ft., to replace a building destroyed by fire recently.

Three Pittsburgh bankers, namely, Arthur E. Braun, Farmers Deposit Bank; John W. Chalfant, Colonial Trust Company, and John O. Miller, Safe Deposit & Trust Company, purchased at sheriff's sale March 6, at Uniontown, Pa., the holdings of the Isabella-Connellsville Coke Company, for $250,000. It is understood the property was purchased on behalf of the bondholders and that a new concern, the Hecla Coal Company, may grow out of the sale.

The February wage distribution in the Youngstown district was the largest in its history. That month $3,355,514 was paid out by local manufacturing plants. The January payroll was $2,675,707.

The Hillman-Neff Coke Company, Oliver Building, Pittsburgh, has filed notice of an increase in its capital stock from $5000 to $300,000.

The Rodd Company, which was recently incorporated in Pennsylvania, has offices in the Commonwealth Building, Pittsburgh. It has been appointed general agent for the Ohio Wood Preserving Company, Pittsbugh Wood Preserving Company, Michigan Wood Preserving Company of Pittsburgh and also the Compressed Wood Preserving Company of Cincinnati, all of which manufacture creosoted timber, ties and wood blocks. Thomas Rodd, Jr., is president and treasurer, and Ernest S. Park is vice-president and secretary.

The Standard Chain Company, Pittsburgh, Pa., has increased its capital stock by an issue of $200,000 of common stock, which has been sold at par for cash. The proceeds will be used to pay for recent new construction at its electric welding plant at York, Pa., and part for future extensions. The company has installed recently a large forging department at its Braddock plant and a few months ago reopened its Mansfield plant at Mansfield, Ohio, after an idleness of six months. John C. Schmidt, York, Pa., is president.

The National Tube Company, Pittsburgh, has placed most of the important contracts for the large extensions it will make to its Lorain works at Lorain, Ohio. These will include four 80-ton open-hearth furnaces and soaking pits, which the company will build itself. A contract for a 40-in. blooming mill with tables and other equipment has been given to the Mesta Machine Company, Pittsburgh; an electric motor, developing about 5000 hp. at 100 r.p.m., to the Westinghouse Electric & Mfg. Company: a 3000-hp. gas engine and generator, to furnish power for the new motor that will drive the blooming mill and the other electrical equipment, to the Allis-Chalmers Mfg. Company.

The Dairymen's Supply & Construction Company, Pittsburgh, with a capital stock of $20,000, has been incorporated by H. T. Winney, John L. When and T. B. Humphries, Wilkinsburg, Pa.; C. G. Chappel, Moore, Pa., and others, to manufacture machinery and supplies for dairies, etc.

The Portage Motor Club, Portage, Pa., with a capital stock of $10,000, has been incorporated by W. H. Troxell, Portage, Pa., and fourteen others to operate a garage and automobile repair shop.

The Bent Rung Ladder & Mfg. Company, Indiana, Pa., with a capital stock of $50,000, has been incorporated by J. E. Parnell and others to manufacture ladders and kindred products.

Six of the 12 additional hot tin mills under erection for some months at the plant of the Standard Tin Plate Company, Canonsburg, Pa., have been com-

pleted and are in operation this week. When the other mills are finished the company will have a total of 22 hot tin mills and will be able to turn out 1,750,000 boxes of tin and terne plate per year. All the new mills will be electrically driven, and it is the intention of the company to change the other 10 mills to electric drive. The 12 new mills were built by the Hyde Park Foundry & Machine Company, Hyde Park, Pa.

The Brown & Zortman Machinery Company, 2535 Liberty Avenue, Pittsburgh, has been appointed distributer in the Pittsburgh district of machine bronze made by the Lumen Bearing Company, Buffalo, N. Y., and has put in a complete stock of the company's products for the convenience of machinery builders and users. The Brown & Zortman Machinery Company is prepared to furnish bronze bushings, either rough or machined, to specifications.

The Department of Labor and Industry, Harrisburg, Pa., announces that the Pennsylvania Industrial Board has adopted the boiler code of the American Society of Mechanical Engineers, and it will be put in operation July 1, 1916, as the Pennsylvania boiler code.

The Garland Nut & Rivet Company, Pittsburgh, has filed a complaint with the Interstate Commerce Commission protesting against a tariff which names a rate of 75c. per 100 lb., with a carload minimum of 80,000 lb., on rivets from Pittsburgh to Seattle. Previously, the complaint says, the same rate was effective, but the carload minimum was 40,000 lb. Request is made that, after a hearing, the commission apply as a maximum in the future a weight of 40,000 lb. per carload on iron rivets less than ½ in. in diameter.

F. C. Wampole & Son, Inc., McKeesport, Pa., with a capital of $25,000, has been incorporated by F. C. Wampole, 1000 North Park Street, McKeesport, W. P. Wampole, and others, to manufacture musical instruments, talking machines and accessories.

The Woods & Golden Construction Company, New Castle, Pa., with a capital stock of $10,000, has been incorporated by Frank R. Woods, Henry E. Golden and S. W. Woods, to construct bridges, sewers, etc.

The annual report of the Union Switch & Signal Company, Swissvale, Pittsburgh, for the year ended Dec. 31, 1915, shows that the earnings applicable to the payment of dividends were $372,640, being the smallest total for any year since 1909, the last previous period of depression. The outlook for 1916, however, is much better, the unfilled business on hand being the largest in the history of the company.

Directors of the Wheeling Mold & Foundry Company, Wheeling, W. Va., have elected officers as follows: C. E. Blue, chairman; H. E. Field, president; L. V. Blue, vice-president; H. S. Bradley, secretary; C. C. Woods, treasurer; Hulien Guarrier, assistant treasurer.

The United Engineering & Foundry Company, Pittsburgh, has received a contract from the Ashland Iron & Mining Company, Ashland, Ky., for the erection of a 36-in. blooming mill.

The plant of the Cyclops Steel Works, Titusville, Pa., operated for some years by Charles Burgess, has been sold to Carl F. Boker, New York, representing capitalists of that city at the reported price of $400,000. It is said the plant will be greatly enlarged.

The new steel foundry of the Lima Steel Casting Company, Lima, Ohio, which is now in successful operation, is equipped with a 2-ton Whiting converter and a Whiting cupola. The plant was installed under the direction of John Sonnenfeld, who has charge of its operation.

The General Fireproofing Company, Youngstown, Ohio, has increased its capital stock from $1,000,000 to $2,000,000. The company reports its business in very prosperous condition.

The lease of a steel company in the Pittsburgh district on the blast furnace of the Kittanning Iron & Steel Company, Kittanning, Pa., will expire May 1, and, it is said, will not be renewed. The stack has been making ferromanganese. When it goes out it will be relined and the stoves will also be relined. It will resume blast about July 1 on basic pig iron, making about 200 tons per day.

The LaBelle Iron Works, Steubenville, Ohio, is reported to be in the market for 1200 tons of coal per day, shipments to start about July 1, for use in the 84 Koppers by-product coke ovens now being built.

The small blast furnace of the Carnegie Steel Company at Steubenville, Ohio, which has been idle since Oct. 26, 1907, will go in blast this week. It will make about 200 tons per day.

The Buffalo Strike Situation

The Buffalo union machinists' strike remains practically unchanged from the situation reported last week, with the exception of the shop of the D. H. Stoll Company, where the striking machinists and the company have reached a compromise agreement, and the men have returned to work. The lockouts continue at the shops of the Pierce-Arrow Motor Car Company, King Sewing Machine Company, Ericcson Manufacturing Company and other large plants, involving over 7000 employees. I. W. W. agitators, however, have gone to Buffalo from various quarters the last few days, and aside from the machinists' trouble have sought to create labor disturbances in a number of shops. On Monday these agitators started a riot at the plant of the Buffalo Copper & Brass Rolling Mill by preventing the night shift laborers from going to work. Reserve squads of police were sent to the plant, which employs 3300 men, and dispersed the disturbers, and the plant was then shut down for the night. The following morning 90 per cent of the employees returned to work. This disturbance followed the voluntary announcement on the part of the management indicating the granting of increases in pay to the men under a graduate premium system amounting to $3 per week apiece. Skilled employees at this plant are making from $60 to $100 per week and common laborers are paid up to as high as $3 per day.

Activity Shown by Large Contracts

A contract for a power plant for the Detroit Iron & Steel Company, Detroit, Mich., has been awarded to Arthur G. McKee & Co., Cleveland, Ohio. The equipment comprises a 500-kw. turbo-generator and a 27,000-cu. ft. turbo-blower, with auxiliaries. An extension of the ore trestle is to be made by the same contractors. Other important contracts taken recently by Arthur G. McKee & Co. include material handling equipment to be installed at the new blast furnace of the Republic Iron & Steel Company, Youngstown, Ohio, comprising 16 Baker suspension type ore bins, a 300-ton coke bin, a 50-ton McKee stock transfer car, two McKee type scale cars, a coke breeze handling system, etc.; two McKee automatic revolving blast-furnace stock distributors for the Iroquois Iron Company, Chicago, which will be in addition to one such distributor already in operation; an automatic revolving stock distributor for the new blast furnace of the Pulaski Iron Company, Pulaski, Va., that is now being built by McKee & Co.; McKee automatic revolving stock distributors for the No. 3 blast furnace recently built and the No. 5 furnace now under construction at the Steelton plant of the Pennsylvania Steel Company, two McKee scale cars for the same plant, and the reconstruction of the ore trestle of the Penn Iron & Coal Company, Canal Dover, Ohio.

The Sterling Motor Truck Company, Milwaukee, Wis., is materially increasing its plant capacity, the new buildings being practically ready for occupancy. This company has developed, in the design of its several sizes of trucks, from 1500 lb. to 7 tons, an interchangeability and a uniformity of parts that have materially enhanced production efficiency in manufacture. Parts of trucks of different sizes which perform the same functions, while varying in size in accordance with the strength required, are of similar design, so that shop jigs and methods of machining are essentially duplicated except for dimensions.

PERSONAL

Several changes in officials at the plant of the Maryland Steel Company, Sparrows Point, Md., have been announced. Matthew J. Scammell, who has been superintendent of blast furnaces, has been made general superintendent of the steel plant, which place formerly was filled by Quincy Bent, assistant to President F. W. Wood. The vacancy left by his promotion will be filled by John J. Sullivan, who has been assistant superintendent of blast furnaces. Charles T. Woodruff, who has been the general storekeeper, becomes Mr. Scammell's private secretary. J. Park Upp has been made storekeeper. Mr. Scammell was formerly connected with the plant of the Carnegie Steel Company at Youngstown, Ohio. He is a graduate of Lafayette College. Mr. Sullivan is a graduate of Pennsylvania State College and is said to be the youngest man to have charge of the furnaces at Sparrows Point.

A. A. Baker, engineer draftsman at the Steelton plant of the Pennsylvania Steel Company, has resigned to become inspector of construction for the H. Koppers Company, Pittsburgh.

W. Walley Davis, superintendent since 1907 of the Pennsylvania district plants of the Semet-Solvay Company, at Steelton, Lebanon and Dunbar, has been made superintendent of the Chicago district plants and manager of the By-Products Coke Corporation, with headquarters at Chicago, effective April 1. He is succeeded by C. E. Lewars, assistant at Steelton.

G. L. Kothny has terminated his connection with the Westinghouse Machine Company, Pittsburgh, and has joined the staff of the C. H. Wheeler Mfg. Company, Philadelphia, in the capacity of consulting engineer.

H. H. Vaughan, president Montreal Ammunition Co., Ltd, has been elected a director and a vice-president of the Dominion Bridge Company, Ltd.

Glen B. Hastings, Chicago, has been appointed representative of Hamilton & Hansell, New York, for the sale of the Rennerfelt electric furnace in the Middle West.

J. Wallace Taylor has accepted a position with the Invincible Machine Company, Walkerville, Ontario, Canada, as superintendent. He was until recently affiliated with the Harris Automatic Press Company, Niles, Ohio, in the capacity of chief engineer.

The A. H. Fox Gun Company, Philadelphia, has added to its organization Conrad V. Hahn, formerly instructor in engineering at Temple University and University of Pennsylvania, and until recently affiliated with the Bell Telephone Company of Pennsylvania in the traffic engineering division. He will be assistant to the vice-president and have charge of one of the Philadelphia plants.

The Cleveland Branch, National Metal Trades Association, Cleveland, Ohio, held its annual meeting March 2 and re-elected its officers as follows: President, Christian Girl, president Perfection Spring Company; vice-president, Franklin Schneider, Van Dorn & Dutton Company; treasurer, J. D. Cox, Jr., Cleveland Twist Drill Company; directors, A. W. Foote, Foote-Burt Company; N. S. Calhoun, Johnson-Jennings Company; J. H. Francis, Kilby Mfg. Company, and Henry Souther, Ferro Machine & Foundry Company.

Emmett B. Carter, chief engineer, Midvale Steel Company, Philadelphia, has been appointed chairman of the Philadelphia section committee of the American Society of Mechanical Engineers. William R. Jones, engineer of construction, University of Pennsylvania, is secretary of the committee.

Roy E. Brakeman, assistant chief engineer of the steel works and the blast-furnace department of the Tennessee Coal, Iron & Railroad Company, has been appointed chairman of the Birmingham section committee of the American Society of Mechanical Engineers. Charles B. Davis, C. B. Davis Engineering Company, is vice-chairman of the committee, and Paul Wright, sales engineer of the column department of the American Cast Iron Pipe Company, is secretary-treasurer. J. Henry Klinck, of the Westinghouse Electric & Mfg. Company at Birmingham, and Frank G. Cutler, chief of the bureau of steam engineering of the Tennessee Coal, Iron & Railroad Company, are members of the committee.

George Kingdon Parsons, consulting engineer, member of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, announces the location of his main offices in the Equitable Building, 120 Broadway, New York, in addition to his location in the Riggs Building, Washington, D. C.

J. G. Perrin, chief engineer, Timken-Detroit Axle Company, will address the Detroit section of the Society of Automobile Engineers, March 17, on "The Evolution of the Rear Axle."

Capt. H. S. Chamberlain, the veteran iron master, president of the Roane Iron Company, Chattanooga, Tenn., recently underwent an operation from which he has not recovered as hoped for and his condition has caused his friends some apprehension.

Ivar Alfsen, who last year resigned as export manager of the American Woodworking Machinery Company, Rochester, N. Y., after more than seven years' service, recently resumed his connection with that company in the same capacity.

Dr. Hjalmar Lundbohm, who has long been a prominent figure in the Swedish iron ore industry, is now a visitor in the United States. He has been the guest of Albert Broden of Temple, Pa, and is now making a short stay in New York.

Fred A. Geier, president Cincinnati Milling Machine Company, and Walter H. Geier, manager Modern Foundry Company, Oakley-Cincinnati, Ohio, sailed from New York March 11 for a month's cruise in the West Indies.

Clare C. Gamble, of the Allied Machinery Company of America, now controlled by the American International Corporation, sailed March 11 for Petrograd, Russia, where he will have charge of the financial affairs of the company's branch office in that city.

The International Steam Pump Company, 115 Broadway, New York, announces that E. P. Worden, formerly of the Fred M. Prescott Steam Pump Works, Milwaukee, has been appointed chief engineer of Henry R. Worthington, Harrison, N. J.

P. P. Bourne, formerly chief engineer of the Blake & Knowles Steam Pump Works, East Cambridge, Mass., is again associated with the International Steam Pump Company in connection with special engineering work, located at the main office, 115 Broadway, New York.

F. A. Schroeder, formerly with the United Engineering & Foundry Company, Youngstown, Ohio, has been appointed chief engineer of the open-hearth steel plant of the Youngstown Iron & Steel Company at Haselton and also of its sheet mills and pressed steel department at Youngstown.

Fred D. Wilkerson has been appointed general manager of mining and transportation of the Brier Hill Steel Company, Youngstown, Ohio, and Clyde Haynes has been made his assistant.

F. H. Moyer has been appointed chief engineer of the Cambria Steel Company, Johnstown, Pa., to succeed E. W. Clarke, recently appointed superintendent of the rolling mills of the company. Mr. Clarke succeeded Charles E. Duncan, who now is identified with the Donner Steel Company, Buffalo, N. Y.

C. Louis Allen, who started two years ago as a salesman in the Pyrene Mfg. Company, 52 Vanderbilt Avenue, New York, has been elected president, succeeding Darwin R. James, Jr., who leaves to become president of the American Chicle Company.

The Bucyrus Company, South Milwaukee, Wis., at its annual meeting, March 8, re-elected the officers and added William Bigelow, Milwaukee, and W. A. Merriman, Chicago, to the board of directors. The president is W. W. Coleman; vice-president, E. K. Swigart; sec-

retary, G. A. Morrison; treasurer, Daniel P. Eells; assistant secretary, W. B. Given, Jr.; general counsel, M. D. Follansbee.

E. A. Burns, Hartford, Conn., has been appointed superintendent of the Plantsville branch of the Rowe Calk Company, Plantsville, Conn. He formerly occupied the same position but relinquished it because of the serious illness of a member of his family.

Hugh F. Rockwell, Rockwell-Drake Company, Hartford, Conn., who was severely injured in the recent New Haven wreck at Milford, Conn., is in a New York hospital, where a fracture of the cheek bone was reduced.

A farewell banquet was given March 10 by the West Side Iron & Metal Company, Detroit, Mich., to Samuel Fogelman, who has been office manager for several years, and will embark in business under the style of the Wayne Scrap Iron & Metal Company, with office and yard at 119 Campbell Avenue, Detroit. The banquet was well attended by Detroit scrap-iron dealers. In appreciation of his services Louis Zeiger and D. S. Luntz, proprietors of the West Side Iron & Metal Company, presented Mr. Fogelman with a fine gold watch.

William M. Johnston, formerly resident salesman of the Carnegie Steel Company, Toledo, Ohio, has resigned to become purchasing agent for the American Shipbuilding Company, Cleveland, Ohio, succeeding Norman S. Thrasher.

The Cincinnati Branch, National Metal Trades Association, held its annual meeting and banquet at the Hotel Sinton, March 2. The following officers were elected: President, August H. Tuechter; vice-president, J. B. Doan; secretary, John A. LeBlond; business secretary, J. M. Manley; treasurer, William Emmes; executive committee, Murray Shipley, E. A. Muller and C. H. Fox. Augustus Wood, general manager, and J. J. Seybold, superintendent, Niles Tool Works Company, Hamilton, Ohio, were among the guests.

George A. Edgin was appointed purchasing agent of the Duff Mfg. Company, Pittsburgh, Pa., March 1, and D. W. Weissenstein, formerly purchasing agent, was appointed supervisor of production.

Robert Donner, son of William H. Donner, has been appointed general sales manager of the Donner Steel Company, Buffalo. Frank H. Horele, who has been connected with the Cambria Steel Company, has been appointed assistant general sales manager of the Donner Steel Company.

Samuel K. Pierce has resigned as assistant treasurer of the New England Structural Company, Boston, and has taken an interest with the John W. Cowper Company, engineer and contractor, Buffalo, as treasurer of that company, effective as of March 1.

Ohio Sheet Metal Contractors' Convention

The officers of the Ohio Master Sheet Metal Contractors' Association held a meeting in Columbus, Ohio, March 1, and arranged a tentative program for the annual convention to be held in Cincinnati, July 25 to 27. The first morning session will be given over to the registration of members and guests, and an open meeting will be held that afternoon. On the following morning a business session will occupy the attention of the members and the afternoon and evening will be given over to the Cincinnati Master Sheet Metal Contractors' Association, under whose auspices the visitors will be entertained with a dinner at Chester Park. The last day of the convention will be devoted entirely to business, when addresses will be made on overhead expense by M. B. Armstrong, London, and George Thesmacher, Cleveland. The officers of the Cincinnati Association are as follows: F. W. Stechow, president; John Weigel, vice-president; Charles Kobmann, treasurer; John Henggeler, secretary.

The Laclede Steel Company, St. Louis, Mo., has increased its capital stock from $400,000 to $1,400,000 to cover its recent acquisition of the Alton Steel Company's plant and also to extend its capacity.

Davis-Bournonville Company Changes

The Davis-Bournonville Company, New York and Chicago, manufacturer of oxy-acetylene and oxy-hydrogen welding and cutting apparatus, announces several changes and additions in its selling organization. W. R. Noxon succeeds W. S. Schoenthaler as manager of the Chicago office, Mr. Schoenthaler going to the company's general offices in Jersey City. H. H. Armstrong has been appointed district sales manager for the Pittsburgh district, the Pittsburgh sales office and demonstrating plant being removed to 316 Penn Avenue. A demonstrating plant and a commercial welding department have been established at 147 West Austin Avenue, Chicago, with F. J. Maeurer, formerly superintendent of the welding department at the Jersey City shops, in charge, H. Ulmer succeeding him as superintendent of the Jersey City welding department. John B. Redd, formerly with the Pacific Gas & Electric Company, and superintendent of the Collective Gas Exhibit at the Panama-Pacific Exposition, and George S. Pearson, recently with the American Stove Company and superintendent of that company's exhibit at the Panama-Pacific Exposition, have joined the Davis-Bournonville sales organization. Mr. Redd will give special attention to the artificial and natural gas industry, in application of oxy-acetylene welding to pipe lines and other work, and Mr. Pearson will be connected with the general offices at Jersey City. The company is now erecting an additional building at the Jersey City plant, which will give 40,000 additional feet of floor space, providing for approximately double its present production of apparatus.

Wyman & Gordon Reorganization

The Wyman & Gordon Company, Worcester, Mass., which has a branch plant in Cleveland, Ohio, has been reorganized. A new corporation, the Wyman-Gordon Company, has been formed with capital stock of $3,000,000, one-half of which will be common stock, $1,000,000 6-per cent sinking fund cumulative first preferred stock, and $500,000 second preferred stock. There will be no change in the management. The officers and directors are: George F. Fuller, president; Harry G. Stoddard, vice-president; Charles C. Winn, clerk; Robert F. Herrick, Wilmot R. Evans, Robert C. Morse and Charles M. Thayer completing the board of directors. Mr. Herrick and Mr. Morse were among the men who recently bought into control of the Reed-Prentice Company, Worcester. Mr. Herrick is widely known on account of his connections with other large industries, notably the International Corporation, of which he is vice-president; the Pacific Mills, the Saco-Lowell Shops and the Ludlow Associates. The common stock and the second preferred stock will be held by those active in the management, and a limited amount of the first preferred stock will be placed on the market by Jackson & Curtis, Boston, who have purchased the issue. The company is very busy and is making additions to its plants in Worcester and Cleveland.

Changes at Remington Arms Plant

Certain statements in the local papers, which have been copied by outside newspapers, have conveyed an erroneous impression of recent changes in the management of the works of the Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn.

It is learned on good authority that the facts are these: Major Walter G. Penfield continues his position as general works manager of the Remington Arms-Union Metallic Cartridge Company, although it is understood that he will, for a time at least, devote most of his attention to the rifle plant. C. C. Tyler, vice-president of the company, will, for a time, give his entire efforts to the ammunition works as acting works manager. Major Phillips and Colonel Dickinson have not been retired and are still in the service of the company.

The Manufacturers' Equipment & Engineering Company has moved from 209 Washington Street to 136 Federal Street, Boston, where both the office and salesroom will be located.

OBITUARY

MELVILLE H. BARKER, general manager American Tool & Machine Company, Boston, Mass., died March 9 from pneumonia at his home in Dorchester, aged 72 years. He was born in Bridgeton, Me., but was taken by his parents to Waukesha, Wis., when he was three years old and later lived in Chicago. He took an architectural course in Wisconsin State University and served an apprenticeship in a Chicago architect's office. His family then removed to Lawrence, Mass., and Mr. Barker there became connected with the repair department of the Everett mills as draftsman. In 1874 he accepted the position of mechanical engineer with the American Tool & Machine Company, being appointed general manager in 1894. He was a charter member of the National Metal Trades Association and has since been continuously a member of the Administrative Council, serving as president of the association in 1907. He was a member of the Engineers', Art and City clubs of Boston and the Engineers' and Machinery clubs of New York. He leaves his widow and two children.

JULIEN P. FRIEZ, inventor and builder of scientific instruments and head of Belfont Laboratory, Baltimore, Md., died March 9 from pneumonia, aged 64 years. Born in France, Mr. Friez came to this country when he was 13 years old. He attended college at Ottawa, Ill., where he helped to build telegraphic instruments, and later became associated with Robert Henning. Their work was absorbed by the Western Electric Company. Eventually engaging in business in Baltimore, he specialized in meteorological apparatus. His shops adjoined his home and practically every foreign country had ordered scientific instruments from him. He leaves his widow, three sons and three daughters.

ERASMUS D. LEAVITT, who attained great prominence as a mechanical engineer, died at Cambridge, Mass., March 11, aged 79 years. He entered the Naval Academy in 1861 and after graduation was detailed to service in the institution as an instructor in steam engineering. For many years he was consulting engineer for the Calumet & Hecla Mining Company, designing much of the equipment now in use at Calumet, Mich. He was also advisory engineer and designed machinery for the Bethlehem Steel Company and for mining concerns in South Africa. He leaves three daughters.

WILLIAM SOOY SMITH, for many years prominent at Chicago in his profession of civil engineer, died March 4, at Medford, Ore., aged 85 years. He specialized in the construction of concrete foundations and was largely responsible for the methods which made possible the erection of the larger buildings at Chicago where the sinking of piers to bed rock, sometimes at a depth of 100 ft., is necessary. He was a veteran of the Civil War. While active in his profession, he lived at Riverside, a suburb of Chicago.

R. N. DENHAM, secretary Landis Machine Company, St. Louis, Mo., died March 5 from heart disease, aged 68 years. He was born in Cleveland, Ohio, and had served in the Civil War. For a time after the war he was judge of the Municipal Court at Cleveland. He had been secretary of the Landis Company since 1908. He leaves his widow and two sons. This is the second officer of the Landis company to die recently, the other having been R. F. Fleming, vice-president.

CAPT. ALFRED HICKS, Pittsburgh, died at his home in that city March 7, aged 79 years. He founded the Allegheny Steel & Iron Company, now the Allegheny Steel Company, at Brackenridge, Pa., was also president of the Interstate Steel Company, Pittsburgh, and had been a large coal operator. He had not been active in business for nearly 20 years. He leaves his widow, two sons and one daughter.

WILLIAM H. DAYTON, for 40 years master mechanic of the Excelsior Needle Company, Torrington, Conn., died March 6. He was an inventor of swaging and automatic machinery and had frequently been sent abroad to install machinery for the Torrington Company. He leaves a son, James M., East Orange, N. J., general manager of the Splitdorf Electrical Company, Newark, N. J.

LANDON CARTER WELLFORD, manager of sales, Richmond Forgings Corporation, Richmond, Va., died Feb. 18, from cerebral meningitis, after an illness of one week.

HENRY A. HOLCOMB, founder of the New Bedford Boiler & Machine Company, New Bedford, Mass., died March 10 at his home in that city, aged 70 years.

WALTER W. KELLY, secretary Cleveland Tool & Supply Company, Cleveland, Ohio, died March 9 after a year's illness, aged 38 years.

Pipe Rate Denied on Steel Culverts

WASHINGTON, D. C., March 13, 1916.—The movement in the trade to secure the establishment of commodity freight rates on galvanized corrugated sheet-steel culverts on a parity with sheet-iron and sheet-steel pipe will doubtless gain an impetus from a decision just rendered by the Interstate Commerce Commission in the case of the Greenburg Iron Company vs. Chicago & Eastern Illinois Railroad Company et al., in which the commission refuses to direct the carriers to classify corrugated steel culverts as pipe in order that a lower rate may result. The complainant is engaged in the manufacture of road machinery, steel bridges and corrugated culverts at Terre Haute, Ind., and alleges that the charges collected by the carriers for the transportation of certain carloads of culverts from the place of manufacture to Texas points were unreasonable and unjustly discriminatory. No commodity rates applied. The Western classification, which governed the movement, rated corrugated sheet-steel culverts in carloads, minimum weight 20,000 lb., fourth class, making a rate of $1.06 per 100 lb. A commodity rate of 69c. per 100 lb., minimum weight 36,000 lb., applied and still applies on sheet-iron pipe 30 in. or less in diameter, and the complainant contended that this rate was applicable to the shipments involved. W. L. C.

Continued Large Locomotive Buying

Orders for nearly 270 locomotives and inquiries for over 200 have appeared in the last two weeks, not counting orders for 350 small 7-ton gasoline locomotives which the Baldwin Locomotive Works is to build for the Russian Government. The Baltimore & Ohio has ordered 50 Mikado locomotives from the Baldwin Locomotive Works and 10 mogul from the Lima Locomotive Corporation, while the American Locomotive Company will build 50 Pacific engines for the New York, New Haven & Hartford. The New York Central is building 10 to 20 switching locomotives in its own shops for the Cleveland, Cincinnati, Chicago & St. Louis. The Chicago & Northwestern has ordered 35 Mikado, 14 Pacific and 28 switching locomotives, or 77 in all, from the American Locomotive Company, while the same company will build 18 for the Central of Brazil and 12 for the Chicago, St. Paul, Minneapolis & Omaha. The principal inquiries include 30 from the Chicago, Burlington & Quincy, 20 from the Pere Marquette, 6 each from the Long Island and Canadian Pacific, 10 from the Boston & Albany and 50 from the Canadian Northern.

Bogert & Hopper, 67 Barclay Street, New York City, are manufacturing wood fuse-hole plugs for use in protecting the nose of a shrapnel shell. The plugs are automatically turned from hard wood and are threaded and slotted, after which they are treated with paraffine. The company owns its timber lands and has factories in Maine.

The output of the new steel plant of the Broken Hill Proprietary Company, Ltd., at Newcastle, New South Wales, for the 12 weeks ended Jan. 12, 1916, was 22,687 tons of pig iron, 16,185 tons of open-hearth steel, 14,956 tons of blooms and 11,876 tons of rails.

Pittsburgh-Pacific Rate, 65 Cents

WASHINGTON, D. C., March 14, 1916.—The Interstate Commerce Commission has denied the application of the transcontinental lines to extend the existing rate of 55c. per 100 lb. on iron and steel articles shipped from Chicago to the Pacific coast to similar shipments originating in the Pittsburgh territory. Instead, it has authorized a rate of 65c., displacing the present rail rate of 73.9c., which is a combination of the local rate of 18.9c. from Pittsburgh to Chicago with 55c. now in force from that point to the coast. A large number of iron and steel manufacturers intervened in the case, those in the Pittsburgh district supporting the application, while Chicago and Atlantic seaboard shippers opposed it, the interveners including the Bethlehem Steel Company, Cambria Steel Company, Interstate Iron & Steel Company, Sharon Steel Hoop Company, Des Moines Bridge & Iron Works and Pittsburgh-Des Moines Steel Company, Lackawanna Steel Company, Colorado Fuel & Iron Company, Pittsburgh Steel Company, Brier Hill Steel Company, Milliken Brothers, Inc., Inland Steel Company, Alan Wood, Iron & Steel Company, Pennsylvania Steel Company, Petroleum Iron Works Company, American Iron & Steel Mfg. Company, Jones & Laughlin Steel Company, Toledo Bridge & Crane Company, Minneapolis Steel & Machinery Company, Lukens Iron & Steel Company and Detroit steel fabricators.

The commission in January, 1915, authorized the carriers to establish a rate of 55c. on certain iron and steel articles from Chicago and all points between Chicago and the Missouri River to Pacific coast points, with certain limitations respecting the rates to intermediate points of destination. The carriers on Sept. 27, 1915, requested authority to extend the application of this rate to iron and steel articles from Pittsburgh and common points and from Cincinnati and common points to the coast without making such rate applicable to intermediate points of destination. Protests against the application were filed by certain steamship lines which contended that the water tariffs which justified the adoption of 55c. from Chicago were abnormally low and have recently been increased 50 to 65 per cent, due in part to the fact that more freight has been offered the boats in service than they could carry and in part to a conviction upon the part of the water lines that they had unnecessarily depressed the rates between the two coasts. A normal water rate, the steamship companies contend, is above rather than below 40c., while the rate of 30c., which was in force when the rail rate from Chicago to the coast was fixed at 55c., is unreasonably low.

The shippers in the Pittsburgh district and other districts that can be benefited by the proposed change urge that the rate of 55c. now in effect from Chicago gives that point an undue advantage over Pittsburgh in coast business, but Chicago shippers assert that their geographical location entitles them to a lower rate than Pittsburgh. Atlantic seaboard shippers also oppose the proposed cut, asserting that 55c. from Pittsburgh would put the seaboard at a marked disadvantage. According to testimony in the case, Pittsburgh is looked upon as the great price-making point for iron and steel, several witnesses testifying that, for example, the Seattle buyer in the Chicago market pays for iron and steel in that market a price as much higher than the Pittsburgh price as the rate from Chicago to Seattle is lower than the rate from Pittsburgh to Seattle, the conclusion being that no consumer on the Pacific coast benefits by the reduction of rates to coast points unless such reductions apply from Pittsburgh. In rendering its decision the commission says:

> It is possible that ultimately the commission should authorize the establishment of 55c. from Pittsburgh in order to permit the movement of these articles by rail. The local rate Pittsburgh to New York on most of the important articles in this list is 16.9c. per 100 lb. A 30c. rate from New York to the Pacific coast would attract a large percentage of this traffic to the boat lines as against a 55c. rate all rail. However, conditions have changed quite materially since the Panama Canal was opened, and under present conditions the 40c. rate more nearly represents what the water competition now is, or is likely in the near future to be, than does the 30c. rate. It seems clear that ordinarily the commission should not, by relief from the fourth section, authorize the carriers to go any further in meeting water competition than is necessary to meet the competition afforded by water routes, because to do so would give a permanent advantage to some localities to the disadvantage of competing localities. A 65c. rate from Pittsburgh on these iron and steel articles under the conditions that existed during the year 1915 prior to the closing of the canal by slides would permit the movement of these articles via New York and water thence to the coast, and would permit also the movement of a considerable percentage of the traffic by rail.

The commission authorizes the carriers to establish "from Pittsburgh and points grouped therewith and from Cincinnati and points grouped therewith rates on these iron and steel articles of 65c. per 100 lb. to the same Pacific coast points to which we have authorized the establishment of the 55c. rates from Chicago, the rates to intermediate points on these articles to be controlled by the requirements of the fourth section of Order No. 124, of April 30, 1915." W. L. C.

Railroad Car Buying

Foreign inquiries and orders for railroad cars from rather unusual sources have characterized the market in the past two weeks. The French State Railways is in the market for 2000 gondolas, 1000 flats, 500 box cars and 1500 box car parts; the Paris-Lyons-Mediterranean, for 300 to 400 tank cars and 500 box car parts; the American Trading Company, for China or Japan, for 1500 to 2000 boggie cars; the Canton-Hankow Railroad, for 150 gondolas and 40 flats, and the Malang-Stroomstram-Maakchuppij-Amsterdam Railroad, for 50 freight cars, besides a report that the Russian Government is seeking 15,000 to 18,000 freight cars. Foreign car orders placed include 50 box cars for the Tientsin-Pekin Railroad and 25 general service cars for the Cie des Forges and Acieries de la Marine et d'Horecourt of France, both taken by the Pressed Steel Car Company. The American Car & Foundry Company will furnish the Kengan Refrigerating Line of China 100 cars. The total comprises foreign inquiries for about 25,000 cars and sales of 75.

Domestic car business is quieter and carbuilders are pretty well filled with orders. The Haskell & Barker Company, however, has taken orders for 500 refrigerator cars from the Great Northern and the Barney & Smith Company 500 box and 300 flat cars from the Atlantic Coast Line, which road has also placed orders for 100 steel underframes with the Pressed Steel Car Company. The Western Steel Car Company will build 9 steel underframes, 7 gondolas and 2 flat cars for the Chicago, Lake Shore & South Bend and 1000 automobile and 500 stock cars for the Chicago & Northwestern. The New York Central has bought 1000 box cars from the American Car & Foundry Company for the New York, Chicago & St. Louis Railroad. The Illinois Central is inquiring for 1400 cars, including 700 combination cars, and the Consolidated Coal Company for 1000 cars. The Chicago, Burlington & Quincy will announce its award for 1000 box and 500 automobile cars next week. Domestic orders recently amount to about 4000 cars.

The United Smelting & Aluminum Company, Inc., New Haven, Conn., manufacturer of aluminum ingots, alloys, rods, etc., has opened a branch office at 24 Stone Street, New York. C. J. Wolfe, formerly connected with the Aluminum Company of America, and lately with the Cleveland Metal Products Company, Cleveland, Ohio, will have charge of this office, which has been opened to receive inquiries for all products manufactured by the company.

The Obenberger Drop Forge Company, Cudahy, Wis., is to be known in the future as the Ladish-Obenberger Company. Substantial additions are to be made to plant capacity which will include the installation of a 6000-lb., a 3500-lb., a 2000-lb. and a 1500-lb. drop hammer, a 5-in. Ajax forging machine, a 6-in. Covington shear and profilers and shapers for the machining and sinking of dies.

AMERICAN RAIL MILL PRACTICE*

A Comparative Summary of Raw Materials, Steel-Making Methods and Mill Equipment

In June, 1915, the rail committee of the American Railway Engineering Association appointed a sub-committee on rail mill practice to visit the several mills and report upon the methods in use in manufacturing rails. The purpose was to obtain information concerning developments and improvements in recent years in the art of making rails and particularly those which had to do with the quality of the rails. The report includes a brief general description of the several rail plants and a comparison of practices, divided into the different stages in the manufacture of rails, such as ore supply, open-hearth practice, methods of rolling, etc.

Omitting the portion of the report which treats of the ore supply and the constituents of the coal, coke and limestone used, more important data are given as follows:

BLAST FURNACES

The number of the blast furnaces, their daily capacity in gross tons of iron, and the percentages of some of the constituents in the iron, are given in the subjoined table:

Blast Furnaces

Mill	Number Furnaces	Daily Capacity	P	S	Mn	Si
Algoma	3	750	.13	.04	1.00	.85
Bethlehem	..	....	.50	.04	.60	1.00
Cambria, Franklin	8	3,300	.15	.04	1.75	.90
Carnegie	11	5,000	.20	.04	1.60	1.50
Colorado	6	2,100	.18	.03	.30	1.50
Ill.-Gary	8	3,200	.20	.04	1.50	1.20
Lackawanna	7	3,100	.30	.05	.90	1.25
Maryland	4	1,800	.05	.03	.90	.85
Pennsylvania	6	2,250	.13	.03	.65	1.30
Tennessee	6	2,400	.80	.04	.40	.90

In addition to the elements shown, the metal at the Colorado mill contains a small amount of copper, and at the Maryland and Pennsylvania mills the metal contains nickel and chromium. The Tennessee metal is very high in phosphorus which the company has started to recover and make available for fertilizer.

STEEL MAKING

In the accompanying table in addition to the Bessemer equipment shown, some of the plants have Bessemer converters which are not used for making rail steel, or make only a small tonnage of it.

It will be noted that at most of the mills the carbon is worked out in making the steel and then brought up to the desired amount by means of pig iron or spiegel. Two of the mills "catch the carbon coming down"; that is, the furnace is tapped when the carbon in the bath gets down to the desired amount or slightly below and the deficiency is made up by adding coal or coke to the ladle while tapping the furnace. This method was formerly more extensively used, but it seems that the carbon aimed at in the steel is secured with less certainty. The recarbonizer is added at some mills to the ladle while tapping the furnace and at other mills it is added to the furnace before tapping. The latter method probably is more certain in securing uniform mixture, although there probably is also more loss of silicon by absorption into the slag.

In adding manganese the most general practice is to add it to the ladle as cold 80 per cent ferromanganese while tapping the furnace, although some of it is sometimes added to the furnace before tapping, using the larger lumps this way to insure thorough melting and mixing with the steel. Some plants add the manganese as liquid spiegelized iron to the ladle while tapping the furnace, which thus adds the carbon, manganese and silicon at the same time. Probably the practice that is most effective in obtaining thorough mixture of all the ingredients before tapping the steel from the ladle is that at the Carnegie rail plant, where liquid spiegelized iron is added to the furnace before tapping into the ladle.

Aluminum is rather generally used as a mold addition in amounts of 1 to 2 oz. per ton of steel. Some plants use it regularly and others aim to omit its use when the steel sets quiet in the mold without it. Gary uses no aluminum in rail steel, depending upon sufficient silicon to obtain quiet setting steel. This plant also has a rule not to use ingots with "horny tops" for rails.

ROLLING PRACTICE

In the accompanying summary of rolling mills it will be noted that most of the mills have two-high reversing rolls with adjustable top roll, thus affording variable draft in blooming. Such rolls have considerable flexibility, but have not, however, a high tonnage capacity, due to the necessity for reversing the direction of the rolls after each pass. Three of the mills divide the blooming among several stands with fixed passes. Observation seems also to indicate a greater tendency to the tearing of the sides of the bloom at these mills, although this is a matter for more critical investigation before definite conclusions are warranted. An accompanying table gives the following blooming mill types.

RAIL MILLS

At half of the mills the rails are direct-rolled from the heat of the ingot, while at the other mills the blooms are reheated, being given a "wash" heat. The Tennessee plant has a bloom reheating furnace, that can be used for heating up cold blooms when necessary.

Equipment / *Treatment*

Mill	Process	Mixers	Bes. Converters	O.H. Furnaces	How Recarbonized	How Mn and Si Added	Al Added to Mold
Algoma	Bes.-O. H.-Dupl.	2- 150 T 1- 250 T	2- 5 T	3- 40 T 4- 80 T	C worked to 0.5. H. Coal added to ladle..	Cold Fe Mn part to furnace, part to ladle. Cold Fe Si to ladle..	Experimenting
Bethlehem	O. H.	1- 250 T 1- 450 T 1-1,000 T	....	16- 75 T	C worked to 0.1. Liquid iron added to furnace	Cold Fe Mn, part to furnace, part to ladle Cold Fe Si to ladle.	Yes
Cambria-Franklin	O. H.	1- 300 T	....	17- 80 T 3-100 T	C worked to 0.3. Liquid iron added to furnace	Cold Fe Mn and Fe Si added to ladle.....	Yes
Carnegie	O. H.	1- 500 T	.....	14-100 T	C worked to 0.1. Liquid spiegelized iron to furnace adds C, Mn and Si.....	Liquid spiegelized iron to furnace	Yes
Colorado	O. H.	1- 200 T	.....	15- 65 T	C worked to 0.1. Liquid iron added to furnace	Cold spiegel part to furnace, part to ladle.	Yes
Ill.-Gary	O. H.	.....	.....	42-100 T	C worked to 0.2. Liquid iron added to furnace	Cold Fe Mn and Fe Si added to ladle.....	No
Lackawanna	O. H.-Dupl.	2- 300 T 1- 600 T	4-12 T	7- 80 T 11-100 T 2-250 T	C worked to 0.2. Liquid spiegelized iron to ladle adds C, Mn and Si.	Liquid spiegelized iron to ladle	Yes
Maryland	Duplex	1- 140 T 1-1,000 T	3-18 T	5- 50 T	C worked to 0.2. Liquid spiegelized iron to ladle adds C, Mn and Si.	Liquid spiegelized iron added to ladle.....	Yes
Pennsylvania	O. H.-Duplex	1- 400 T 1- 800 T	2-25 T	6- 90 T 2-200 T	C worked to 0.1. Liquid iron added to ladle..	Cold Fe Mn and Fe Si added to ladle.....	Yes
Tennessee	Dupl.-Tripl	1- 250 T 1- 600 T	2-20 T	8-100 T	C worked to 0.5. Coke added to ladle.....	Fe Mn part to furnace, part to ladle, Fe Si mostly to ladle, part to molds.....	Yes

*From the report of the sub-committee to the rail committee of the American Railway Engineering Association.

but is not used in the regular rolling of rails. The Maryland plant has installed a bloom reheating furnace, but it has not yet been put into use. Most of the mills saw the rails singly from the hot bar. This method is, of course, slower than where two or more

Ingots and Blooms

Mill	Size Ingots	Soaking Pits-Capac. Ingots	Blooming Rolls	Blooming Passes	Size Bloom
Algoma	19x23	96	1-2 high revers	19	8x8
Bethlehem	19x23	175	1-2 high revers	15	8x8
Cambria-Franklin	20½x23	128	1-2 high revers	15	9x10
Carnegie	23½x23½	210	2-2 high	..	..
			1-3 high	11	10x10
Colorado	20x22	144	1-2 high revers	13	8x8
Ill.-Gary	20x24	192	4-2 high	9	7½x8
			1-3 high	..	..
Lackawanna	19x19	168	2-2 high	6	8x8
			1-2 high revers	..	..
Maryland	21x23	72	1-2 high revers	15	8x8
Pennsylvania	20x24	64	1-2 high revers	19	8x8
Tennessee	24x24	144	1-2 high revers	15	8x8

rails are cut from the bar at one time, but the rails can probably be cut closer to the length desired when sawed singly. One very noteworthy feature in rolling rails is the device used by the Lackawanna Steel Company for hot milling the bar, as described in THE IRON AGE of Dec. 10, 1914.

Rail Mills

Mill	Reheater Capacity Blooms	Shaping Passes	Total Passes	How Sawed	Hot-bed Feet	Straightening Presses	Loading
Algoma	48	11	30	Singly	212	5	Skids
Bethlehem	60	11	26	Singly	420	6	Magnets
Cambria	75	12	27	.....	...	6	Magnets
Carnegie	36	13	24	Twos	...	..	Magnets
Colorado	None	10	23	Singly	300	7	Skids
Ill.-Gary	None	9	18	Gang	600	16	Magnets
Lackawanna	None	9	15	Singly	553	13	Magnets
Maryland	None	11	26	Singly	336	8	Magnets
Pennsylvania	48	10	29	Singly	336	8	Magnets
Tennessee	None	9	24	Gang	...	..	Magnets

Extensive changes have been made among the rail mills in recent years. The rail plants of the Carnegie and Pennsylvania steel companies have been mostly rebuilt and important changes have been made at some of the other plants. One feature of interest is that there has been considerable improvement in testing equipment and in the amount of investigative work being done by the mills. At the Algoma Steel Company a matter of special interest is the nick and break test of a piece of rail from each ingot and the examination of the fracture for both pipe and segregation.

Sixth Annual Westinghouse Dinner

About 500 employees of the various Westinghouse companies held their sixth annual banquet in the Fort Pitt Hotel, Pittsburgh, Saturday night, March 11, the dinner being arranged under the auspices of the Westinghouse Club, an organization composed of male employees. The toastmaster was Trumen P. Gaylord, acting vice-president of the Electric Company. The principal speaker was William L. Saunders, vice-chairman of the Naval Consulting Board, chairman of the board of directors of the Ingersoll-Rand Company and president of the American Society of Mining Engineers. The subject of his address was "Industrial Organization for Peace and War." Wesley G. Carr, patent attorney, of the Electric Company, spoke on the "Potency of Service." Taking the life of George Westinghouse as a theme, Mr. Carr pointed out the lessons which might be drawn from his character and habits.

The Hoevel Mfg. Corporation has been organized, with offices at 50 Church Street, New York, to manufacture the Hoevel sandblast machines which formerly were imported. H. F. Hoevel, president of the corporation, recently returned from Germany where he made arrangements with the foreign makers to build the machines here. He has completed the manufacturing details with an American company.

Factory Lighting Code Discussed

At a joint meeting of the New York sections of the American Society of Mechanical Engineers and the Illuminating Engineering Society held in the Engineering Societies Building, March 14, the code of lighting for factories, mills and other work places recently issued by the Illuminating Engineering Society was discussed. This code is designed to afford a basis for legislation on the standards of quantity and quality of light required for industrial purposes. C. E. Clewell, assistant professor of electrical engineering, University of Pennsylvania, spoke as the representative of the Illuminating Engineering Society and showed how all the various interests concerned in illumination had participated in the preparation of the code, the committee including representatives of manufacturers of both gas and electric lamps, the Travelers' Insurance Company and a large manufacturing concern. In his address he laid particular stress upon the intensity of artificial light required for various kinds of work and showed how this code was greatly in advance of the British one in which the minimum intensity of light was not specified. The four general classes of work mentioned in the code are storage spaces, passageways, etc., for which a minimum intensity of 0.25 foot-candles is recommended, rough manufacturing with an intensity of 1.25 and fine manufacturing and other operations with a recommended illumination intensity of 3.50 foot-candles. For the fourth group, special cases of fine work, an intensity of from 10 to 15 foot-candles is considered desirable but no minimum is specified, the exact amount being left to the discretion of the owner's lighting expert.

L. P. Alford, editor *American Machinist*, speaking for the American Society of Mechanical Engineers, expressed his appreciation of the code as a whole. He thought, however, that the plane upon which the illumination was to be measured should be specified at a definite number of inches, say 30, above the floor, while an oblique plane would be even better than a horizontal one, but, of course, would not be so easy to define. He commended the section dealing with the arrangement of lamps and machinery so as to avoid casting shadows and stated that this provision should be enforced. He took exception to one of the articles which provided for illumination by lamps mounted overhead according to a system of general lighting in preference to individual lighting, stating that this differed materially from the remainder of the code as it specified a method of lighting rather than an attempt to control results. He deemed it unwise to include this as it was apt to arouse antagonism to the adoption of the code on the part of engineers.

In the general discussion that followed the code as a whole was highly commended, although a number of the speakers took exception to the specifying of minimum illumination for various classes of work, believing that this should be left entirely to the lighting expert employed by the manufacturer. The proneness of the workman to judge the amount of illumination by the visibility of the light source and its glare was commented upon and mention was made of the possible use of coloring matter on the globes to reduce the objectionable glare that was sometimes encountered.

On April 20 another joint meeting will be held, this time with the Society of Automobile Engineers, when the question of the most desirable number of cylinders in an automobile power plant will be discussed.

The National Enameling & Stamping Company, Granite City, Ill., as announced by George W. Niedringhaus, general manager, will begin at once the construction of a plate mill to cost, for the initial unit, about $200,000. It will be an auxiliary to the company's steel works at Granite City and will be in operation in six months, or sooner if its equipment can be completed. It will be devoted to the manufacture of steel plates, such as are used in the building of railroad cars, and the American Car & Foundry Company will use a large part of the output. The rolling mill of the old West Superior Iron & Steel Company, Superior, Wis., owned by the United States Cast Iron Pipe & Foundry Company has been purchased for shipment to Granite City.

Report of American Steel Foundries

The annual report of the American Steel Foundries for the year ended Dec. 31, 1915, shows a net loss on the operations of the year of $313,435, against a loss of $231,481 in the preceding year. A comparison of the income account of the two years is as follows:

	1915	1914
Gross sales	$10,024,870	$11,125,091
Expenses	9,507,545	10,487,588
Net profit	517,325	637,503
Other income	189,523	87,159
Total income	706,848	724,662
Interest charges	238,609	252,212
Sinking funds	233,590	222,943
Bond redemption	344,000	249,532
Depreciation	204,083	231,455
Deficit	$313,435	$231,482

President R. P. Lamont calls attention to the fact that, with only about $4,000,000 of bonds and debentures outstanding, the company's charges for bond interest and for bond redemption and debenture retirement amount to about $720,000 a year, or over 4 per cent of its outstanding capital stock. He says that "in these lean years it is unfortunate that the retirement provision of our bond issues are so heavy, but of course we are paying off our debts and adding to the book value of our stock at a corresponding rate." The working capital at the end of 1915 was $4,543,062, against $4,722,092 at the beginning of the year, showing a loss of $179,030. Further extracts from remarks of President Lamont are as follows:

"We started the year with four plants shut down and with less tonnage on our books than at any time since 1909. The marked improvement in business which is now in evidence did not come until the last quarter and it was December before we were able to get all of the plants running to capacity. Taking the average for the year, the plants operated at 46.5 per cent of their capacity as against 50.4 per cent for 1914.

"Only five months out of the twelve show profits after interest charges, and the marked difference in conditions as between the beginning and the end of the year is illustrated by the fact that January showed a loss of $79,000, whereas December showed profits of $156,000 after interest charges. There was spent during the year for repairs and maintenance and absorbed in manufacturing costs $949,184, and there was charged for depreciation $204,083.

"At the present time we have more tonnage on our books than ever before in the history of the company, and at improved prices. In addition to this volume of work in our regular lines we have orders for steel and forgings for foreign account amounting to approximately $18,000,000, a considerable part of which, however, has been sublet to other manufacturers. Under normal conditions we could look forward with confidence to a record breaking year both in output and earnings. On account of the uncertainties of the war, or the Presidential election, and of the crops it is impossible to see very far ahead. However, with the very large tonnage already booked we can see satisfactory earnings ahead for at least six months, and we are very hopeful for the balance of the year."

The Pittsburgh Steamship Company, subsidiary of the United States Steel Corporation, has under contract six 12,000-ton ore vessels, three for delivery in 1916 and three for delivery in 1917. Four of these will be built by the American Shipbuilding Company and two by the Great Lakes Engineering Works. No further additions to the Lake fleet of the Steel Corporation are contemplated at present.

At the annual meeting of the Electric Steel & Metals Company, Welland, Ont., Canada, E. Carnegie, Sir Charles Ross, W. L. Renton, Col. R. W. Leonard and William Carnegie were elected directors. At the directors' meeting held subsequently E. Carnegie was elected president and general manager and W. L. Renton, vice-president.

The National Armor Plant Project

WASHINGTON, D. C., March 14, 1916.—The Senate has agreed to vote March 21 on the bill introduced by Senator Tillman and recently reported by the Senate Committee on Naval Affairs, appropriating $11,000,000 for the erection of a Government armor plate factory. In securing this agreement a motion by Senator Tillman making the bill the "unfinished business" before the Senate was adopted by a vote of 55 to 10. While, owing to the absence of a number of Senators known to be opposed to the measure, this vote is probably not an accurate test of the question, yet it is generally accepted as foreshadowing the passage of the bill.

A vigorous protest against the measure will be registered by Senators Penrose of Pennsylvania, Lodge of Massachusetts, and Gallinger of New Hampshire. They will oppose the bill on several grounds, emphasizing the folly of undertaking the construction of such a factory at the present time in view of the abnormal cost of the material and labor. It is the opinion of experts that the Government cannot possibly build a 20,000-ton plant for the amount appropriated by the bill, and it is freely predicted that Congress will have to increase the sum carried by the measure by at least $5,000,000. Certain equipment required for the factory cannot be obtained at any price under two years, it is said, and all the private plate manufacturers agree in the prediction that the Government will be unable to produce armor fit for use on warships under four years.

A feature of the discussion, when the bill is taken up, will be the propriety of authorizing the Government to purchase existing plants. Certain advocates of the legislation favor this method of acquiring a factory, but there is no sentiment in either body of Congress favorable to the condemnation of private plants through the exercise of the Government's right of eminent domain.

W. L. C.

Welded High-Speed Steel Cutting Tools

High-speed steel has been successfully welded to both hot and cold rolled steel bars and to ordinary tool steel by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., by C. B. Auel, director of standards, processes and materials. Larger pieces, equivalent in cross-section to that of the steel bar, have been welded by the incandescent method. This consists in pressing the two parts together while passing a current, so that sufficient heat is generated at the point of maximum resistance—that is, at the junction of the high-speed steel and the bar proper to cause welding. Smaller pieces, such as cutting tips, are welded by the electric arc process.

If the cost of making such welds is calculated, one may ascertain at what price for high-speed steel it will pay to use the composite cutting tools, in other words the price below which one should use only solid high-speed steel bars. The welds on rolled steel bars have been worn to the limit, though the pressure has been sufficient to put a permanent bend to the bar, and with some tools, the movement of chips across the tool has worn away the softer steel so that there is a sharp line of demarcation at the weld.

The Yale & Towne Mfg. Company reports for the year ended Dec. 31, 1915, net profits of $1,993,788, against $451,848 for the year preceding. This is equivalent to 42 per cent earned on the capital stock of the company. The net earnings for the year were $2,126,269, against $663,898 in 1914 and the surplus after payment of dividends $1,374,085, against $136,850. The final surplus was $6,048,824, against $4,436,785 at the close of 1914.

The Ayer & Lord Tie Company, Chicago, recently took an unusual contract in the supplying of wood blocks to be laid over the entire cleaning, grinding and annealing room floor of the Sivyer Steel Casting Company, Milwaukee, Wis.

The fifth annual Safety Congress, to be conducted by the National Safety Council, will be held in Detroit, Mich., on Oct. 16 to 21. W. H. Cameron, Continental and Commercial Bank Building, Chicago, is secretary of the council.

Machinery Markets and News of the Works

LABOR SHORTAGE GENERAL

New England Hurt by Freight Embargoes

Domestic Demand Is Satisfactory and Trade Is Thriving—Growing Fears of Labor Trouble in Central West

In every section of the country business is brisk and the aggregate of orders for machine tools is satisfactory, as it is also for other kinds of equipment, but the machinery trade is not without its troubles and uncertainties. Chief among these is the shortage of labor which is a detriment everywhere, while in New England the railroad freight embargoes have so prevented the movement of materials that factories have been temporarily closed, or some of the working forces laid off. In the Central West there are ominous indications of strike troubles for which professional agitators are working.

Domestic buyers are active in the New York market, where some tool builders report that their unfilled orders are gradually creeping ahead of production. The Dutch Government plans the establishment of a purchasing agency at New York to buy for its colonies.

The West Side Foundry Company, Troy, N. Y., recently installed about $40,000 worth of equipment for the manufacture of automobile specialties, and has further plans in contemplation.

The Pennsylvania Equipment Company, Philadelphia, is in the market for two 10-15-ton locomotive cranes, an air compressor and two switching engines.

Eastern Pennsylvania is being convassed for skilled mechanics.

The Morton Truck & Tractor Company, Harrisburg, Pa., shipped 61 tractors to the Russian Government, but they were turned back from New York by the freight embargo. The company thereon shipped them to Seattle, by special freight, for shipment across the Pacific.

New England labor conditions are a little easier. Some strikes have been settled, but others still hamper operations.

The Beaman & Smith Company, Providence, R. I., has awarded the contract for a 4-story machine shop building, 40 x 160 ft.

The automobile makers continued active purchasers in Detroit, placing considerable of their business with Cleveland machine tool houses. Punching and shearing machinery is in good demand from car and structural shops. The General Electric Company is expected to buy an attractive lot of machinery for its new Fort Wayne plant.

Many additions to plants are projected in Detroit, all of which will require metal working equipment. At Chicago the Inland Steel Company is preparing a substantial list of tools. The Moline Tool Company will erect a factory at Moline, Ill., to cost $80,000.

Scarcity of molders is restricting foundry operations at Cleveland. The Cleveland Wire Spring Company will erect a plant for sheet metal working and will require equipment.

Shipbuilding is thriving in the Pacific Northwest, as it is in other parts of the country. Nine shipbuilding companies of Seattle have contracts for vessels aggregating about $8,250,000, and new companies are being formed.

Financial arrangements for further shell orders have been completed in Canada. Orders for shells will specify small lots, principally, but it is expected that they will aggregate a valuation of $100,000,000 this year. Contracts are being placed daily for practically all kinds of munitions. A few such orders are reported to have been placed in the United States.

The Mississippi Valley Metal Products Company, St. Louis, Mo., is reported to have received an order for 150,000 high explosive shells which are to be manufactured in four plants.

New York

NEW YORK, March 15, 1916.

Despite the subsidence of the war demand, a maker of turret lathes finds it not only impossible to make deliveries of certain sizes of machines this side of October or November, but that the volume of unfilled orders is gradually creeping ahead of production, a situation caused by the excellent demand from domestic industrial sources. The automobile manufacturers, in particular, are fast placing orders for future deliveries. Dealers assert that the domestic demand is growing better every day. The call for second-hand machines is excellent from buyers who do not want to wait for the delivery of new tools. Needless to say, however, second-hand machines are none too plentiful.

A cable from Holland under date of March 10 states that the Dutch Ministry of Colonies is about to establish in New York a permanent purchasing office for the purpose of supplying Dutch East Indian colonies with materials needed for the industrial development of Java and elsewhere. J. I. Inckel, director of the technical bureau of the Colonial Ministry, and J. C. Ankersmit, chief engineer, will sail for New York on the steamer Nieuw Amsterdam, March 18. Railroad equipment in particular will be sought. By arrangement with Dutch shipping companies the purchases will be shipped in Dutch vessels direct from American ports to the East Indies.

The Safety Car Heating & Lighting Company, New York, has been making inquiry for turret screw machines to enable it to fill an order for nearly 700 car lighting equipments.

According to newspaper reports some large shell contracts have been placed within the week. It is reported that the British Government has awarded to the Mississippi Valley Metal Products Company, St. Louis, Mo., an order for 150,000 8-in. high-explosive shells. This company is said to have taken the order on behalf of two companies in St. Louis, one at South Milwaukee, Wis., and one at East Moline, Ill. It is stated that deliveries are to begin in 90 days; that $38.50 is to be paid for each shell, and that the British Government has advanced $721,875 to the contractors. The American Locomotive Company is said to have obtained an additional munitions contract, although officials of the company have denied that this is true.

The West Side Foundry Company, Troy, N. Y., has increased its capital stock from $100,000 to $200,000, and has distributed the new stock to the stockholders in the form of a stock dividend. It has lately installed about $40,000 worth of machinery for the manufacture of automobile specialties and is specializing on an engine-driven automobile tire pump, which it is manufacturing in large quantities. A portion of the plant, hitherto unused, has been remodeled and is devoted to this department. It plans to go further into the manufacture of finished automobile accessories. Charles A. Sleicher is treasurer and general manager.

Edward B. Jordan & Co., Inc., manufacturer of cabinet work, 127 Degraw Street, Brooklyn, N. Y., has had plans

drawn by Frank H. Quinby, 99 Nassau Street, New York, for a four-story and basement addition to its factory to provide for the rapid growth of its business. It is also planning a two-story addition on another part of its property. These two extensions will give over 200,000 sq. ft. additional floor space. The company is now employing about 600 men in the manufacture of talking machine cabinets, and will further increase its force when the additions are completed. Edward B. Jordan, Jr., is treasurer.

The Art Metal Works, 7 Mulberry Street, Newark, N. J., manufacturer of novelties, has let contract for important improvements to its plant, which will greatly increase its facilities.

The Smith & Caffrey Company, proprietor of the Syracuse Architectural Iron Works, Syracuse, N. Y., has purchased land and has prepared plans for a large structural shop, which it intends to erect this year, to increase its output.

The Du Pont Fabrikoid Company, Newburgh, N. Y., has had plans completed for an addition to its plant which will enable it to increase its output 15,000 yd. a day, bringing its total daily output up to 40,000 yd.

The Turner Construction Company, 11 Broadway, New York, has been awarded contract for an addition to the plant of the Union Terminal Cold Storage Company, Thirteenth and Provost streets, Jersey City, N. J., of reinforced concrete, seven stories, 75 x 100 ft. J. G. Glover is the architect.

William Werner, 194 Ridgewood Avenue, Brooklyn, N. Y., has received general contract for a two-story ice plant and storage room, 99 x 149 ft., to be erected on Atlantic Avenue, Brooklyn, for the Putnam Coal & Ice Company, 12 Buffalo Avenue, Brooklyn, at a cost of about $25,000. Henry Senger is president.

Enstice Brothers, 40 Clinton Street, Newark, N. J., has been awarded general contract for two one-story storage buildings, 40 x 100 ft., to be erected at Passaic Avenue, Kearney, N. J., for the American Can Company, 447 West Fourteenth Street, New York City, at a cost of about $48,000.

The Barrett Mfg. Company has awarded contract to the M. Byrnes Building Company, 430 Westfield Avenue, Elizabeth, N. J., for the construction of a one-story mill building, 120 x 161 ft., to be erected at 86 Elizabeth Avenue, Elizabeth, at a cost of about $10,000.

Alexander Milne, 125 West Second Street, Plainfield, N. J., has general contract for the erection of a one-story brick addition, 50 x 100 ft., to be constructed for the Spicer Mfg. Company, Plainfield, N. J., at its plant at South Plainfield, at a cost of $7,000.

The Fletcher & Thompson Engineering Company, Bridgeport, Conn., are reported to be drawing plans for a three-story brick and concrete addition, 200 x 300 ft., to be erected on the Glenwood dock, Yonkers, N. Y., for the Habirshaw Electric Cable Company, 10 East Forty-third Street, New York, at a reported cost of about $100,000.

The Ice Mfg. Company, 1480 Broadway, New York, has had plans completed by Mortenson & Co., 405 Lexington Avenue, New York, for an ice-making plant to be erected at Hart Place, near West Seventeenth Street, at a cost of about $40,000.

The Standard Underground Cable Company, 50 Church Street, New York, has awarded contract to Ira Crouse, 495 State Street, Perth Amboy, for the construction of a one-story brick addition to its tube mill, 100 x 124 ft., to cost about $15,000.

The Seaton Leather Company, Verona Avenue and Oraton Street, Newark, N. J., has awarded contract to the Essex Construction Company, 87 Academy Street, Newark, for the construction of one and three story brick factory additions, 60 x 60 ft., and 40 x 60 ft., respectively, to cost about $22,000. E. E. Grant, 397 Washington Avenue, is the architect.

Bids will be received until March 23 by H. J. Burkhardt, mayor, and I. J. Carmichael, city clerk, Batavia, N. Y., for water-tube boilers, one cross-compound Corliss or Meyer-gear pumping engine, one engine and electric generator, two centrifugal pumping engines, two separate generators, three motor-driven centrifugal sewage pumps and one surface condenser.

The Defiance Paper Company, Walnut Avenue, Niagara Falls, N. Y., has awarded contract for the erection of a two-story brick addition to its plant to cost approximately $50,000.

The National Electrolithic Company, Niagara Falls, N. Y., has let contract for a small addition to its plant.

The Philpott & Leuppie Company, Fourth Street, Niagara Falls, N. Y., manufacturer of stitching machinery, has let contract for a factory building, 45 x 100 ft.

The Triangle Packing Company, Buffalo, has filed articles of incorporation to manufacture mechanical packings. E. H. Letchworth, C. M. Baldy and F. Fernow are the directors. The capital stock is $100,000.

The Niagara Searchlight Company, Ferry Street, Niagara Falls, N. Y., has let contract for erection of an addition to its factory.

The Buffalo Union Furnace Company, Buffalo, N. Y., has taken out permit for the erection of a one-story steel addition to its cast house on the Buffalo River.

The Rockwood Mfg. Company, Rockwood, N. Y., Donald W. Hyde, president, 26 North Main Street, is having plans prepared for a manufacturing plant to be erected this spring.

The Rochester Folding Box Company, Rochester, has plans completed for a new plant, which it will erect on Commercial Street.

Philadelphia

PHILADELPHIA, PA., March 13, 1916.

A limitation of output due to shortage of labor is now an almost universal complaint in eastern Pennsylvania. Since the departure of thousands of foreign hands for Europe, conditions have been greatly aggravated. Farmers and agricultural workers are being taken away from the land in great numbers, not only near the powder plants but also in other centers. Representatives of Cleveland manufacturers and of the Curtiss aeroplane plant in Buffalo have been canvassing Allentown and other centers vigorously for skilled labor. The latter alone is reported to have sought from 50 to 600 mechanics, several welders, and also ten draftsmen. The opening up of the McClintic-Marshall plant at Pottstown and the new American Iron & Steel Mfg. Company steel plant at Lebanon will further intensify these conditions.

Companies are everywhere compelled to make concessions to labor in order to hold their men. The Jeansville Iron Works, Hazleton, added 10 per cent to wages, effective Feb. 15 last. The William Cramp & Sons Ship & Engine Building Company granted about 5000 of its employees 10 per cent increase, aggregating about $300,000 a year. The Florence Iron Works, Florence, N. J., advanced its hands receiving less than $2 a day, 5 per cent increase, effective April 15, with other tentative increases to follow. Philadelphia machine tool makers have for a long time been paying very high wages. In many plants the superintendents are instructed to pay whatever seems fit, and many men are employed with the understanding that after a test of one day's work an increase will be made according to ability.

The International Motor Car Company, Allentown, Pa., has received an order for thirty 2-ton trucks from R. H. Macy & Co., New York City.

The Hale & Kilburn Mfg. Company, Philadelphia, has awarded contract to H. E. Baton, South and Sansom streets, Philadelphia, for the construction of a one-story brick building, 42 x 45 ft., to be erected on Glenwood Avenue near Seventeenth Street, at a cost of about $6,000.

The Pennsylvania Railroad will erect two more car bakeries at its car shops at Altoona.

The North Wales Machine Company, manufacturer of gray-iron castings, pattern work, etc., North Wales, Pa., is building an addition, 60 x 160 ft., which it plans to have in operation in about a month. The company is making reasonable deliveries of both machinery and castings. J. W. King is treasurer and manager.

The Lindholm Metal Stamping Company, 107 Erie Street, Camden, N. J., has completed an addition, 38 x 50 ft., and has awarded contract to the Mockett Construction Company for the erection of two additional buildings, 28 x 44 ft., and 21 x 135 ft., all to provide additional manufacturing space. W. F. Wanervetch is assistant general manager.

The Baily Mfg. Company, manufacturer of automobile bodies, North Wales, Pa., is extending its plant to more than double its present capacity. It is manufacturing exclusively for the Vim Motor Truck Company, Philadelphia, and now has orders for $750,000 worth of its business, which will keep it busy for a year more.

The Wilson Chemical Company plant at Tyrone, Pa., was destroyed by fire March 4, with a reported loss of $150,000. The company is now rebuilding and has already purchased about all the supplies necessary. George C. Wilson is the proprietor.

Frank E. Hahn, 1112 Chestnut Street, Philadelphia, has completed plans for a plant for the Mifflin Chemical Company, Delaware River and Mifflin Street, Philadelphia, consisting of one-story brick and concrete buildings, 60 x 200 ft., 30 x 60 ft., 20 x 40 ft., 40 x 80 ft., and 30 x 50 ft., on which bids will be taken in about six weeks.

The Pedrick Tool & Machine Company, 3640 North Lawrence Street, Philadelphia, is adding a two-story addition, 20 x 50 ft., to its manufacturing and erecting department, which it will equip by a rearrangement of its present plant.

The Pennsylvania Equipment Company, Coleman Building, Philadelphia, is in the market for the following second-hand equipment: Two 10 to 15-ton four or eight-wheel locomotive cranes; one four-wheel saddle tank switching engine, 17 x 24-in. drivers, 44-in., 7-ft. wheel base, weight 45 to 55 tons; one belt-driven air compressor of 1000 to 2500 cu. ft. capacity at 100 lb. pressure, age, condition, price and where available for inspection to be specified; one standard gage 25 to 30-ton saddle tank switching engine, wheel base not to exceed 7 ft. J. C. Bough is manager.

The International Forge Company, manufacturer of brass forgings, Pottstown, Pa., advises that the recent report that its operations had been delayed by non-receipt of equipment, is incorrect. The company is now operating with unusual success. George T. Jacobs is general manager.

Day & Zimmerman, 61 Chestnut Street, Philadelphia, Pa., have received general contract for the erection of a brick and reinforced concrete hydroelectric plant to be erected at Seneca Falls, N. Y., for the Seneca Power Company, at a cost of about $350,000. M. G. Barnes, 36 State Street, Albany, is the engineer.

The Morton Truck & Tractor Company, Nineteenth and Paxton streets, Harrisburg, Pa., has just shipped 61 motor tractors to the Russian Government. After being shipped toward New York they were turned back by the freight embargo. The Morton Company then arranged to have the tractors rushed to Seattle on a special freight train, where they will be loaded on boat for shipment to destination.

The Standard Boiler Works, Lebanon, Pa., which manufactures boilers, tanks, stacks and castings, has been sold to D. O. Mader and E. R. Mader, Lebanon, Pa., it is stated. The plant is located at Twelfth and Buttonwood streets and was formerly operated by C. N. Seidel, deceased. D. O. Mader has severed his connection with J. K. Petty & Co., Inc., owner of the Lebanon Boiler Works, Lebanon, and will devote his time to the new enterprise.

The Weimer Machine Co., Lebanon, Pa., is building a new machine shop and a pattern shop at its plant. The McClintic-Marshall Company has the contract for the machine shop, and Shenk Brothers, Lebanon, will build the pattern shop. Both shops replace ones burned in a recent fire.

The Rosatto-Barry-Street Company, Philadelphia, with a capital stock of $25,000, has been incorporated to manufacture billiard tables and accessories. Frank Rosatto, 222 South Eighth Street, Philadelphia, is one of the incorporators.

The Mauch Chunk Iron Works, Mauch Chunk, Pa., is reported to have purchased property on Lehigh Avenue upon which it will erect a foundry estimated to cost about $60,000.

Contract has been awarded by the Midvale Steel Company, Nicetown, Philadelphia, to Barclay, White & Co., 1530 Chestnut Street, Philadelphia, 128 x 222 ft., one and two stories, of brick and concrete, to cost about $125,000.

The Central Machine Company has awarded contracts for the construction of a three-story brick and reinforced concrete building, 45 x 115 ft., to be added to its plant at Franklin and Wood streets, Philadelphia.

Baltimore

BALTIMORE, MD., March 13, 1916.

The Singer-Pentz Company, 600 Equitable Building, Baltimore, has been awarded a contract for the construction of an annealing building for the Hess Steel Company, after plans prepared by Blanke & Zink, architects, 717 Equitable Building, Baltimore.

Thomas Brothers & Klein, Inc., First Avenue and Second Street, Canton, Md., charcoal makers, will have their plant rebuilt. Contract has been awarded the Singer-Pentz Company, 600 Equitable Building, Baltimore. The building will be of brick, 62 x 100 ft., and cost about $6,000.

Electric equipment will be installed in the fertilizer plant of the Griffith & Boyd Company, Fourth Avenue and Clinton Street, Canton, Md.

With $100,000 capital stock the Chesapeake Engineering Company has been incorporated by Philip G. Fredericks, Law Building, Baltimore; Ezra H. Ford and William J. H. Culp.

The recently organized Baltimore Oil Engine Company, which will manufacture combustion engines, will construct a large plant at Highlandtown, Md. A. W. Gieske, 3 East German Street, Baltimore, is president.

The Standard Oil & Gas Burner Company, Baltimore, has been incorporated with $100,000 capital stock to manufacture oil or gas burners. The incorporators are Otto Buehner, 808 Garrett Building; Henry Hosier and Corwine Bond.

Davis & Hemphill, machinists, Elkridge, Md., plan the construction of a new building for the manufacture of machinery.

The Clarke Gun Company, Richmond, Va., has been incorporated with $15,000 capital stock. W. M. Mulligan, Richmond, is secretary.

Work is being rushed on another building for the Bethlehem Steel Company at New Castle, Del.

A controlling interest in the Pusey & Jones Company, Wilmington, Del., has been purchased by Cristoffer Hannevig of Norway, a member of the ship brokerage firm of Hannevig & Johnson, New York City. It is understood that the shipbuilding facilities at the Wilmington plant will be greatly increased. The board of directors now is composed by Mr. Hannevig, Ralph James, M. Bullowa, S. H. Thomas, John M. Mendinhall, Elbert H. Neese and Robert H. Richards.

According to press dispatches Augustus D. Ledoux, New York City, has purchased a tract of 35 acres on the Christiana River, Wilmington, Del., from the Lobdell Car Wheel Company. No announcement has been made, but the tract may be used by the Pyrites Company, Ltd.

New England

BOSTON, MASS., March 13, 1916.

Each morning the New England manufacturer scans his newspaper to ascertain the present status of the freight embargoes. One morning he reads that the New Haven lines have lifted the embargo for four days on all except soft coal; the next day he finds that the Central Vermont has issued an embargo against shipments for New York, thus closing the last remaining rail route to New York. Probably no parallel to the present New England freight situation ever existed in the United States. There can be but one logical outcome and that is the temporary closing of factories or the laying off of a considerable portion of the working force. This is what is actually occurring at this time. The strangulation not only affects freight consigned to and from connecting roads but seriously affects shipments wholly within New England territory. Shipping overland by motor trucks affords some relief to certain industrial centers but weather conditions limit this. All New England snow records have been broken since the first of February. During this period there have been but eleven clear days. This has also been no small factor in the necessary continuance of embargoes.

The strike situation is a little better. The trouble at the General Ordnance Company, Derby, Conn., has been settled. The H. B. Smith Company, Westfield, Mass., has been successful in partially operating its South Side plant and reports more men returning daily. Conditions at the North Side plant of the company are little changed. There is little disorder but a guard of local, State and metropolitan police are on duty. A second strike of wire workers at the plant of George W. Prentiss & Co., Holyoke, Mass., has been called. The issue is a closed shop. Prospects of a prompt settlement are not bright. The organizing campaign of the Machinists' Union is being pushed but no troubles are anticipated until better weather prevails.

The American Scale Company, Boston, Mass., has been incorporated with a capital stock of $75,000. John M. Nelson is president and James B. Coughlan, North Wales, treasurer.

The Russell Mfg. Company, Middletown, Conn., is to build a two-story machine and carpenter shop, 80 x 100 ft., and a one-story weave shed, 96 x 216 ft.

The Earnshaw Mfg. Company, Hartford, Conn., has been incorporated with capital stock of $50,000, by Henry P. J. Earnshaw, John F. Forward and Edward J. Daly, to manufacture boilers and compressor plants.

The Franklin Paper Company, Holyoke, Mass., is having plans drawn for a boiler house.

The National Mfg. Company, Worcester, Mass., has been incorporated with capital stock of $1,000 by Paul B. Morgan, president; Charles F. Morgan, treasurer, and Ralph L. Morgan.

The Hartford Automobile Parts Company, Hartford, Conn., will double its capital stock and issue $200,000 in preferred stock and $100,000 in common stock.

The Woonsocket Machine & Press Company, Woonsocket, R. I., is running its plant until 9 p. m. four evenings a week.

Plans are being matured by the Waterhouse mill interests, Providence, R. I., to convert the former Hope foundry, Warren, R. I., into a dye plant.

Foster, Merriam & Co., Meriden, Conn., has begun work on a foundry addition 25 x 85 ft., two stories.

The Stanford Steel Products Company, Milford, Conn., has been incorporated with a capital stock of $30,000 by George I. Stanford, president; Clyde Milne, secretary and treasurer, and Franklin I. Mallory.

The Bay State Foundry Company, Westfield, Mass., a new corporation, has leased the plant of the Westfield Foundry &

Valve Company, Westfield, which it will operate. W. C. Waldron is president; Harry B. Putnam, vice-president; Theodore R. O'Brien, treasurer. George W. H. Reynolds, Troy, N. Y., will be manager.

The Davis Foundry Company, Lawrence, Mass., will erect a new and larger plant at Market and Parker streets. James Lanigan is manager.

The Turner Construction Company, 11 Broadway, New York, has been awarded contract for the erection of a machine shop for the Beaman & Smith Company, Providence, R. I., of reinforced concrete and brick, four stories, 40 x 160 ft. Jenks & Ballou are the architects.

Chicago

CHICAGO, ILL., March 13, 1916.

With the exception of the substantial list of tools which is in preparation by the Inland Steel Company for the receiving of tenders, there are reported no industrial inquiries of size now in the market, though the number of scattered tools under consideration continues large. For construction requirements the Inland Steel Company has already purchased a tool room lathe, a bolt cutter and a bolt header. The Michigan Central Railroad is also in the market for a bolt cutter. Bids were received March 11 on the railroad inquiries mentioned last week and as yet no awards have been made. Congestion in the handling of freight and shortage of cars in the Central West is making itself felt both in the receipt of tools from the builders and in the delay of shipments to customers.

The Chicago Wire, Iron & Brass Works, Chicago, has increased its capital stock from $2,000 to $10,000.

The Electric Alloy Steel Company, Chicago, has been incorporated with a capital of $20,000 by C. C. Lilly, L. M. Watson and H. E. Bradley, 133 West Washington Street.

The Universal Stamping & Mfg. Company, Chicago, has increased its capital stock from $10,000 to $20,000.

The Illinois Malleable Iron Company, 1801 Diversey Parkway, Chicago, will build a one-story brick shop at 2850-52 North Paulina Street, to cost $4,000.

The Illinois Seed Company, Chicago, has purchased 393 x 126 ft. on the Baltimore & Ohio track at Forty-first Avenue and Filmore Street, and plans to improve it in the near future with a large plant.

The Swift Machine Company, Chicago, has been organized with a capital of $1,000 by E. W. Rogers, E. A. Rogers and A. V. Miller.

The Vacuum Motor Mfg. Company, Chicago, has been incorporated with a capital stock of $2,500 by Frank A. Urwan, 20 West Jackson Boulevard, J. W. Johnson and George E. Brannan.

George S. Corrington, 2338 West Van Buren Street is erecting a two-story brick factory, 59 x 115 ft., to cost $25,000.

The Moline Tool Company, Moline, Ill., will erect a one-story factory, 150 x 241 ft., to cost approximately $30,000.

The Rockford Drilling Machine Company, Rockford, Ill., has increased its capital from $50,000 to $200,000.

At the recent annual meeting of the Pekin Wagon Company, Pekin, Ill., the following officers were elected: Henry G. Herget, president; Adam Saal, vice-president; Henry Birkenbusch, secretary, and U. J. Albertsen, treasurer.

The Burns Lumber Company, St. Paul, Minn., is erecting a sash and door factory to cost $11,500.

The National Refining Company, Sioux City, Iowa, has plans for a three-story brick and concrete building adjoining its plant, to cost approximately $30,000.

The General Roofing Company, East St. Louis, Ill., has started work on the construction of a plant at Richmond, Cal., to cost $1,000,000.

The Continental Motors Company, Muskegon, Mich., will erect new steel and concrete machine shops.

The J. B. Armstrong Mfg. Company, Flint, Mich., will erect a factory to manufacture springs and axles for automobiles.

The Kalamazoo Sled Company, Kalamazoo, Mich., will erect an addition to its plant.

The machine shop and acetylene works of Chester Huff, Grand Rapids, Mich., were damaged about $1,500 by fire.

R. W. Smith and Frank W. Gay have purchased the controlling interest in the Alloy Steel Spring Company, Jackson, Mich., and under the new name, the Alloy Steel Spring & Axle Company, will expand the business. The capital stock has been increased from $10,000 to $250,000 and the erection of a building for an axle plant is contemplated.

The plant of the International Mill & Lumber Company, Bay City, Mich., was destroyed by fire with a loss of $250,000.

Cleveland

CLEVELAND, OHIO, March 13, 1916.

The demand for about all types of machine tools continues quite active. Considerable business was placed in the local market during the week by Detroit automobile makers and several Cleveland machine tool builders are planning to place orders for additional equipment. The demand for turret lathes is about as heavy as at any time in the past few months, coming from all sections and classes of users. Punching and shearing machinery is in good call from car and structural shops. It is expected that the General Electric Company will require much machinery for the addition it will build to its works at Fort Wayne, Ind. The demand for both heavy and light castings is strong and buyers are inconvenienced by the inability to secure deliveries desired. Some foundries are unable to run at full capacity because of a scarcity of molders.

The Cleveland Wire Spring Company, Cleveland, has acquired a site at Harvard Avenue and East Forty-ninth Street and will erect a building for a sheet metal department to be known as its No. 2 plant. The equipment required has not yet been taken up, but considerable sheet-metal-working machinery will probably be needed.

The Mathematic Wheel Company, Cleveland, has been incorporated with a capital stock of $10,000 by Frank A. Lukes, A. B. Williams, W. J. King and others.

The Columbia Steel Company, Elyria, Ohio, has placed contracts for the erection of a pickling house, 42 x 130 ft., and an annealing department, 54 x 150 ft., of brick and concrete.

The Shunk Plow Company, Bucyrus, Ohio, will enlarge its plant by the erection of a brick blacksmith shop, 40 x 100 ft.

The Marion Tire & Rubber Company, Marion, Ohio, will shortly begin the erection of a new plant which will include two concrete buildings, each 50 x 100 ft.

The Cain Machine Company, East Liverpool, Ohio, has been incorporated with a capital stock of $25,000 by W. M. Cain, J. W. Cain and others.

The Amazon Tire & Rubber Company, Akron, Ohio, has been incorporated with a capital stock of $100,000 and plans the erection of a plant. L. J. Schott and C. E. Bettler are stockholders.

The Binns-Wilcox Company, Akron, Ohio, maker of store and office fixtures, showcases, etc., has been reorganized and has changed its name to the Akron Store Fixture Company. J. B. Binns is president and J. R. Jackson, general manager. It is stated the company is planning to erect a new plant.

The Champion Spark Plug Company, Toledo, Ohio, is erecting a six-story concrete and steel factory, 84 x 140 ft. New machinery will be installed.

The City Machine & Tool Company, Toledo, Ohio, has been incorporated with a capital stock of $10,000 by Amos Lint, Richard D. Logan and Frank O'Neil.

Milwaukee

MILWAUKEE, WIS., March 13, 1916.

The volume of machine-tool business is considered satisfactory, due to the many orders for single tools or small lots. Crane builders are still forced to operate at top speed to meet a spirited demand, especially for 5-ton hoists. Bookings also include a number of cranes up to 25 tons capacity. The power machinery market is reviving and municipalities as well as private utility corporations are placing their requirements. A disquieting report is current that the long-expected union demand for an 8-hr. day will be made by concerted action on May 1. Professional agitators have been working among Milwaukee machinists for six or seven months and seem ready to strike.

The E. L. Essley Machinery Company, Chicago, which purchased the surplus equipment of the Laursen Automatic Pump Company, Eau Claire, Wis., forwarded two carloads of these tools, consisting of large swing lathes, to Winnipeg, Canada, for a munition factory. The remainder has been shipped to Chicago for distribution, all machinery having been placed.

The Bower City Machine Company has been organized at Janesville, Wis., by William C. St. Clair, C. D. Manley and W. C. Greutsmasher, all graduate mechanical engineers, to do a general machine shop and engineering business. A plant is being erected for occupancy April 15. Machine tools are being purchased.

The Obenberger Drop Forge Company, Packard Avenue, Cudahy, Wis., is erecting a one-story forge shop, 75 x 80 ft.

The Stegeman Motor Car Company, 606 Linus Street, Milwaukee, building motor trucks, has placed its shops on a 24-

hr. a day schedule. None of its business is of foreign origin, the company having declined numerous export contracts because of the domestic demand.

Rhodes & Son, Pewaukee, Wis., who lost their public garage and machine shop by fire March 1 will rebuild at a cost of about $10,000.

The Wisconsin Aluminum Foundry Company, Manitowoc, Wis., is in the market for a 5-ton electric traveling crane for its new foundry addition. Bruno Dalwig is general manager.

The Frank L. Wells Company, founder and machinist, South and Exchange streets, Kenosha, Wis., has awarded contract to the Kenwood Bridge Company, 1416 First National Bank Building, Chicago, for a shop building, 45 x 90 ft., two stories.

The Farmers' Equipment Company, Two Rivers, Wis., organized recently, has leased shop quarters and is purchasing machinery. William Plantiko is secretary and manager.

According to a report from Washburn, Wis., the Du Pont Powder Company has authorized further enlargement of the Barksdale plant near Washburn, at an estimated cost of $250,000. Two new triton lines are now being completed, making a total of seven. The plant is employing nearly 1000 workmen, compared with 250 a year ago. F. T. Beers is superintendent.

Cincinnati

CINCINNATI, OHIO, March 13, 1916.

Auto-truck manufacturers in this vicinity state that the export demand has slackened somewhat, but the call for heavy trucks from domestic sources is very encouraging. The question of making deliveries on contract time is one of some concern, especially at some points where skilled labor is not plentiful. Varying reports are made by machine-tool builders. The export business is only good in spots, as compared with the demand for lathes and other machines at this time last year. Domestic trade continues to show improvement with the bulk of purchases being made by munition manufacturers and auto-truck builders.

Building operations on a number of additions to factories as well as a few new plants have been held up on account of the high price of nearly all kinds of building materials. Building contractors state that this condition has even affected adversely the construction of residences. The local labor situation is unchanged, with steady gains being made by shops who are shorthanded. At Hamilton and Dayton the molders are still out in a few foundries.

The R. K. LeBlond Machine Tool Company, Cincinnati, has let contract to the L. Schreiber & Sons Company, Cincinnati, for approximately 1000 tons of steel to be used in the construction of a new machine tool plant in Hyde Park suburb. Work will begin early in the spring.

The Cincinnati Gear Company, Cincinnati, has acquired a site adjoining its plant on Reading Road, and will make additions that will double its present capacity.

It is currently reported that the Lunkenheimer Company, Cincinnati, will soon commence work on its large foundry addition, plans for which were prepared some time ago. A pattern storage building is included in the list of contemplated improvements.

The Oakley Machine Tool Company, Oakley-Cincinnati, has been incorporated with $40,000 capital stock by Joseph S. Graydon, L. E. Voorhies, and others. The company has been operating a machine shop under a partnership arrangement for nearly six months, and has its quarters in the Incandescent Light & Stove Company's plant at Oakley.

Wayne Shurtz, Mason, Ohio, has commissioned Weber, Werner & Atkins, architects, Cincinnati, to prepare plans for a large public garage to be erected at Mason. A small repair shop will be included in the plans.

It is reported, but not officially confirmed, that O. P. Schreiver & Co., Cincinnati, manufacturers of hardware specialties, contemplates making an addition to its plant on East Pearl Street.

The Champion Coated Paper Company, Hamilton, Ohio, will make an addition to its plant, 65 x 115 ft., four stories, mostly for storage.

The Davis Sewing Machine Company, Dayton, Ohio, is having plans prepared for an addition to its plant that will be used as a forging shop. It is understood that considerable forging will be required.

The Miami Brass & Foundry Company, Dayton, Ohio, will construct a plant at McDonough and Bacon streets. Nothing is known as to equipment needs.

The City Machine & Tool Company, Dayton, Ohio, expects soon to commence work on its new plant on East Third Street.

The Vulcan Tool Company, Dayton, Ohio, has been incorporated with $10,000 capital stock by I. I. Hauer, G. L. Lott, and others. No information is yet available as to manufacturing plans.

The American Lathe & Press Company Columbus, Ohio, has formally taken over the plant of the Columbus Machine & Tool Company, which plant it has been operating building lathes for the past eight months.

The Coffman Mfg. Company, Washington Courthouse, Ohio, has been incorporated with $150,000 capital stock by L. C. Coffman and others. The new company has combined the plants of the Coffman Planing Mill Company and the Standard Chair & Table Company, and will increase its manufacturing facilities.

The Monitor Silo Company, Botkins, Ohio, has been organized and will erect a plant for manufacturing wooden silos.

Indianapolis

INDIANAPOLIS, IND., March 13, 1916.

The Horton Mfg. Company, Fort Wayne, Ind., has increased its capital from $50,000 to $200,000, in anticipation of the construction of a large fire-proof building.

The Huntington Machine & Foundry Company, Huntington, Ind., has been sold to Harris Brothers, Chicago, for approximately $42,500, who expect to spend about $15,000 for new equipment and to continue the operation of the factory.

The A. & K. Mfg. Company, Terre Haute, Ind., has been organized by Otis B. Kattman, Earl G. Alspaugh and Frank A. Kattman, with a capital of $1,000, to manufacture iron, steel, metal and malleable products and automobile accessories.

The National Malleable Castings Company, Indianapolis, Ind., will erect a brick and steel building, 82 x 150 ft., to cost about $40,000.

The Evansville Veneer Company, Evansville, Ind., will start work at once on the construction of a new plant to replace the one recently destroyed by fire.

The Inland Steel Castings Company, Terre Haute, Ind., has been incorporated with a capital of $100,000 by Jesse W. Ijams, Frank B. Ijams and Robert L. Smith.

The Grayson Tool Mfg. Business, manufacturer of vertical milling machines, Indianapolis, Ind., has been incorporated by J. H. Grayson and B. W. Simpson, with a capital of $50,000.

The Central South

LOUISVILLE, KY., March 13, 1916.

Business continues very good in all departments of the trade. Sales of boilers and power equipment, both steam and electrical, are numerous and an unusual condition is reported in the refrigerating machinery field. This has taken the form of a keen demand from the Lake region where, due to the abnormal weather of the past winter, an ice famine is threatened and plants will be established for manufacture of artificial ice. Inquiries and specifications are being received in numbers. The principal cause of uncertainty is the difficulty of obtaining materials with which to fill orders.

The American Preparator Company is being organized in Louisville by Albert Kraetzer, Fourteenth and Hill streets, and others, to manufacture a steam device for curing lumber. Contract for manufacture of the device has been let to Joseph Walton & Co., boiler makers, who will make it for the present; later the American Preparator Company will equip a plant.

An installation of eight 500-hp. boilers has been sold by the Henry Vogt Machinery Company, Louisville, to the Solar Refining Company, Lima, Ohio. The demand on the Vogt plant has been so heavy that it has been running day and night.

The Southern Fire Apparatus Company, Inter-Southern Building, Louisville, incorporated with $33,000 capital, will sell fire-fighting equipment on an agency basis, purposing later to establish a manufacturing plant. J. M. Hoffman and E. R. Jennings are incorporators.

The International Farm Implement Company, Owensboro, Ky., with $100,000 authorized capital, has filed incorporation papers to manufacture a patented ditcher and grader and new disk harrow. For the present the machines will be assembled in Owensboro, but later the company will establish a plant to manufacture both in Owensboro. W. E. Smith, F. J. Laswell and M. F. Bransford are incorporators.

The Ayer & Lord Tie Company, Chicago, is reported to be a prospective purchaser of 5800 acres of timberland near Cadiz, Ky., to cut the timber.

B. H. Alvey, Louisville, inventor of a patented automo-

bile top, is reported to be seeking to make arrangements to establish a plant to manufacture it.

The American Metallic Packing Company, Walnut and Clark streets, Lexington, Ky., is in the market for a straight-line, steam-driven, 150 cu. ft. per min. air compressor, complete, and a Porter 36-in. gage 12-ton steam locomotive, both second-hand and in first class condition.

The Dixie Gray Marble Company, Box 609, Knoxville, Tenn., has been incorporated with $50,000 by H. B. Lindsay, W. J. Donaldson, and others, and is in the market for quarrying equipment, steel derrick, hoisting engine, boiler, channeler, drills, air compressor, etc.

C. E. Murray, proprietor of the Trafford Heading Company, Dechard, Tenn., is in the market for a Jumbo Trever or Gerlock heading saw, and for a powerfeed circular cut-off saw, to be installed at Trafford, Ala.

M. W. Kinzer and G. D. Blackwell will build a 25-bbl. flour mill at Hampshire, Tenn.

W. E. Buis will rebuild a burned flour mill at New Tazewell, Tenn., daily capacity of 50 bbl.

The Moran Flexible Steam Joint Company, 115 North Third Street, Louisville, is in the market for a used No. 3 milling machine, with dividing head, in good condition.

St. Louis

ST. LOUIS, MO., March 13, 1916.

The Platifrice Chemical Company, St. Louis, Mo., has been incorporated with a capital stock of $25,000 by Wesley A. Chamberlain, Thomas W. Williams and Fred Heckwolf, and will equip to manufacture dental machinery and fixtures.

The Union Tire & Rubber Company, St. Louis, Mo., incorporated in Delaware, has been authorized to use $400,000 of its $500,000 capital in manufacturing operation in St. Louis. E. G. Stearns of Chicago, is largely interested.

The Funck Lumber Company, St. Louis, Mo., will erect and equip a wood-working plant adjoining its present plant, for the manufacture of "ready cut" houses. Much equipment will be needed.

The Heil Packing Company, St. Louis, Mo., will erect and equip an addition to its plant, to cost about $40,000.

The plant of the Kraushaar Brass Mfg. Company, St. Louis, Mo., recently burned, will be rehabilitated and new equipment installed.

The Booth-St. Louis Cold Storage Company, St. Louis, Mo., is reported in the market for about $22,000 worth of additional cold storage warehouse equipment.

The Iowa Elevator Company's plant at Peoria, Ill., was burned March 6, with a loss of $1,000,000. It is stated that the 11-story elevator will be rebuilt.

The Lehr Construction Company, St. Joseph, Mo., has been incorporated with a capital stock of $20,000 by James W. and Arthur L. Lehr and George B. Womack, and will equip for bridge fabrication and similar steel work and construction.

The Western Type Machinery Company, Kansas City, Mo., has been incorporated with a capital stock of $24,000 by A. G. Blauner, G. R. Tuttle and L. D. Hauserman, to manufacture and rebuild printing presses.

The St. Joseph Cold Storage & Warehouse Company, St. Joseph, Mo., will erect a cold storage warehouse, to cost $125,000.

Kirksville, Mo., will expend about $100,000 on extension of the waterworks pumping station and electric generating plant.

The machine shop of Paul Leistner & Sons, St. Charles, Mo., has been burned with a loss of $2,000 on machinery.

F. L. Williamson, Scarritt Building, Kansas City, Mo., is in the market for a sixty-cycle three-phase, 2300-volt generator of 200 and 300 kw. capacity; a steam generating set of 100 to 200 kw., three-phase induction motors of 10 to 50 hp., etc.

The Zittlosen Mfg. Company, St. Louis, Mo., has increased its capital stock from $100,000 to $200,000 and will add to its equipment for metal manufacture.

The Cupples Station Light, Heat & Power Company, St. Louis, Mo., operating three isolated generating plants, will equip a central plant. Hugo Wurdack is president.

The Texas Motor Company, Texarkana, Ark., has been incorporated with a capital stock of $25,000 by J. K. Waddy, B. W. Anthony and R. E. Dove, and will equip a machine shop and garage.

The Gotebo Light & Power Company, Gotebo, Okla., is in the market for one 25 to 50-kw. direct-current generator, one 15 to 20-kw. generator, oil engines, etc.

Fred Ford and A. H. Roberts, Ada, Okla., will equip a machine shop and an electrical repair shop.

The Blackwell Oil & Gas Company, Blackwell, Okla., will equip a pipe line, pumping station, etc. About $210,000 will be invested.

The Canadian Valley Bridge & Construction Company, Oklahoma City, Okla., has been incorporated with a capital stock of $200,000 by H. F. Mitchell, Oklahoma City; James E. Wright, Newcastle, Okla., and George D. Kay, Tulsa, Okla., to fabricate and erect bridges, etc.

The Southwest Tire Mfg. Company, Oklahoma City, Okla., has been incorporated with a capital stock of $250,000 by W. A. McClelland, J. T. Wheatley, John L. McClelland and C. Charles Jones.

L. E. Butterick and Richard Seips, Oklahoma City, Okla., will erect a garage and machine shop, two stories, 100 x 125 ft.

Machine shops and repair plants for the handling of motor cars, etc., will be equipped by W. W. Woodworth, Ringling, Okla.; Levi G. Hurst, Supply, Okla., and M. D. and Frank Herrington, Watonga, Okla.

The Meridian Lumber & Mfg. Company, Meridian, Miss., will build a mill of 15,000 ft. capacity every 8 hours at Pachuta, Miss., and another of similar capacity near Schamberville.

New Iberia, La., has voted $90,000 bonds for new sewer construction, including a disposal plant. Xavier A. Kramer, Magnolia, Miss., is preparing plans.

The Southern Lumber Company's mill at Myrtis, La., which has been burned with a loss of about $75,000, will be replaced.

W. R. Perkins, New Orleans, La., will equip a garage and machine shop at Lake Charles, La., at a cost of about $25,000.

Birmingham

BIRMINGHAM, ALA., March 13, 1916.

Appliances for lumber mills and mines cannot be supplied with the dispatch desired. Cotton ginning apparatus is in demand. General business conditions are quite satisfactory with all wholesale houses.

The Gadsden Car Works, Gadsden, Ala., will expend $25,000 in improvements, including a steel tank.

The Gadsden Brick Company, Gadsden, Ala., is preparing to install electric brick-making machinery.

The Sumter Mfg. Company, Livingston, Ala., capital stock $20,000, will manufacture lumber. A. C. Leinke, R. F. Bacon and others are stockholders.

The Aycock Wood Brick Veneer Company, capital stock $500,000, has been organized at Aycock, Fla., by T. J. Aycock of Aycock, W. E. Aycock of Moultrie, Ga., and others.

The Pacific Northwest

SEATTLE, WASH., March 7, 1916.

The lumber market continues very strong, and while shipments have been seriously hampered by a shortage of cars, sawmills and logging camps are being put in shape for full operation as rapidly as possible. Many plants are installing new equipment, and metal-working tools are being added to repair shops. No lack of demand for machine tools is apparent, but the shortage of supplies is limiting business. Shipbuilding plants are working at practically full capacity, and efforts are being made to extend their facilities. Mining, agricultural, grain handling and packing-house machinery is in steady demand.

Nine shipbuilding companies at Seattle, Wash., have contracts for the construction of vessels of a total value of $8,258,000. The Skinner-Eddy Corporation has contracts for five steel vessels, and will employ 1400 men on three shifts through the summer. At Portland, a new shipbuilding company is to be formed in a few days by men connected with the Smith & Watson Iron Works and the Columbia Engineering Works, who will invest considerable money in special shipbuilding equipment.

The Chicago, Milwaukee & St. Paul is in the market for 100 flat cars. This road is now building 100 logging cars in its Tacoma shops. The New York Central Lines have inquiries out for 4,500,000 ft. of lumber, and the Great Northern, it is understood, will soon place an order for 500 refrigerator cars, to use 3,500,000 ft. of lumber, Douglas fir being specified.

The Booth Kelly Lumber Company, Eugene, Ore., has secured a contract to supply 9,000,000 ft. of fir to the Ralston Steel Car Company, Columbus, Ohio, to be used in constructing 2000 cars for the Southern Pacific Railway. Orders for an additional 6,000,000 ft. have been placed in Eugene for cars for the Southern Pacific Company.

The demand for vessels has resulted in offers of unprecedented amounts for cannery vessels belonging to various companies operating large cannery fleets out of Seattle; but all offers have been refused.

The Fisher Flouring Mills Company, Seattle, Wash., has let a contract for additional buildings, and will increase its daily capacity from 2000 bbl. to 5000 bbl.

The Port of Astoria Commission, Astoria, Ore., has under consideration equipment for the new grain elevator, to cost about $12,000.

The Lindstrom Shipbuilding Yards, Aberdeen, Wash., have been taken over by capitalists, headed by Albert Schubach, of Schubach & Hamilton, Seattle, who will expend about $10,000 for improvements. Contracts for several vessels are held by the company.

The cannery of the Pacific Sea Food Company, La Conner, Wash., was completely destroyed in a recent fire, with a loss of more than $15,000. It is understood the plant will be rebuilt.

The Clatsop County Court, Astoria, Ore., plans the installation of a 50-hp. motor, centrifugal pump and electric drilling machine, etc., in its rock crushing plant at Tongue Point. T. S. Cornelius is in charge.

The National Infusorial Earth Company, C. F. Denny, president, operating a plant at Ellensburg, Wash., will purchase crushing and drying machinery to increase its output to 100 tons daily.

Armour & Co., Spokane, Wash., will expend $20,000 in improvements and extensions to their plant on 123 Wall Street. A. A. Hallander is manager.

The West Coast Chemical Company, Seattle, Wash., incorporated for $50,000, plans to manufacture aniline dyes in the factory at Woodlawn and Fifth avenues, which will have a capacity of 100 to 150 lb. of dyestuffs per day. Philip A. Carleton is president, and George N. Clakins secretary and treasurer.

The electric power plant of the Oregon Power Company, North Bend, Ore., which was damaged to the extent of $5,000, by fire, will be repaired.

The Dallas Planing Mills, Dallas, Ore., F. J. Coad, manager, will enlarge its plant, and install machinery to manufacture wooden tanks, etc.

The Willamette Valley Lumber Company, Willamette, Ore., plans to install machinery for the manufacture of wooden articles.

The Ferndale Canning Company, Ferndale, Wash., has been organized by Ed. Brown, M. Jones, F. Bottler and Clifton Dean with a capital stock of $15,000 and plans the erection of a plant.

Texas

AUSTIN, TEX., March 11, 1916.

With the opening of spring the machinery and tool trade shows further improvement. The installation of new machinery in public utility plants is receiving much attention.

The Big Springs Ice & Mfg. Company plans to build a cold storage plant of 150 tons capacity and to enlarge its ice factory at Big Springs.

The City Commission, Fort Worth, contemplates building a pumping station on the completed end of the conduit that runs to Lake Worth.

Taylor Brothers, Denton, will build a cotton gin, to cost about $10,000.

Darragh Brothers will enlarge their granite quarries at Granite Mountain in order to fill a contract for furnishing the Federal Government with 1000 carloads of stone for the construction of jetties at Aransas Pass.

The Cleburne Traction Company, Cleburne, has been incorporated with a capital stock of $15,000, to operate an electric street railway and generate power and light.

The San Antonio Gas & Electric Company, San Antonio, subsidiary of the American Light & Traction Company, New York, will install additional equipment in its electric light and power plant at a cost of about $150,000.

Government Purchases

WASHINGTON, D. C., March 13, 1916.

The general purchasing officer, the Panama Canal, Washington, will receive sealed proposals until 10.30 a. m., March 31, circular 1022, for lathes, electric motors, etc.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9408, for two mixing and dehydrating presses for Washington; schedule 9409, for miscellaneous pumps for Brooklyn; schedule 9410, for one rotary shear for Philadelphia; schedule 9429, for one planing machine, 35 ft. long, for Mare Island.

Canada

TORONTO, March 13, 1916.

The financial arrangements connected with further shell orders for Canadian industrial companies are practically completed. The Canadian Bankers' Association has agreed to the proposals of Sir Thomas White, Minister of Finance, looking to co-operation in the extension of the credits which are necessary, and an official announcement to that effect may be expected at once. The orders which the British Government is placing are not in bulk, but are coming in every day and are being placed as they are received, though in each instance competitive bids are asked. This year it is estimated the total new orders will aggregate one hundred million dollars, but they will be spread out rather than be awarded in one lot. These contracts are being placed with firms already in the business and having the necessary equipment. The contracts, which are being placed in small lots almost daily, cover all sizes of shells, boxes, cartridge cases, primers, etc. The orders are not being made public, but they are all in the nature of additional contracts for those already in the business. To the extent indicated there is no doubt of the business being secured, especially as the bankers have agreed to arrange the necessary credits. The only element of anxiety is as to the possible delays in delivery. The Munitions Board months ago explained that the rate at which contracts were being executed was far from satisfactory. The situation is said to have improved meanwhile, but it is still such as to cause some anxiety.

The Cobourg Felt Company, Ltd., Cobourg, Ont., is in the market for a 16-in. engine lathe, 4 to 6 ft. between centers.

The Union Carbide Company, Ltd., Welland, Ont., will build an addition to its drum shop to cost $20,000. J. C. Duffin is the contractor.

The Imperial Oil Company, Montreal, will build an asphalt refining plant at Point aux Trembles, Montreal, to cost about $1,500,000.

Work will be started soon on a sulphuric acid plant for the Aetna Chemical Company of Canada, Ltd., at Drummondville, Que., to cost $300,000.

The Joliette Steel Company, Joliette, Que., is building an addition to its plant and will be in the market for steam and electrical power machinery, etc.

The London Foundry Company, London, Ont., is contemplating the erection of an addition to its plant to cost $10,000. E. Grobb is manager.

Joseph Gertler, 676 Drolet Street, Montreal, is making repairs to his iron works on Bellechasse Street to cost $4,000.

The Michigan Central Railroad Company, Detroit, Mich., will spend $250,000 on the erection of a roundhouse, coal dock, etc., at Montrose, Ont.

Fire did $15,000 damage to the plant of the Canadian Metal Mfg. Company, St. James and Richmond streets, Montreal.

The directors of the International Safe Company, Fort Erie, Ont., have decided to build an addition to their plant.

Ottawa, Ont., will have a pumphouse and sub-station erected at once on Lemieux Island at a cost of $86,000. Thomas McLaughlin has received the contract.

The Harris Abattoir will build an addition to its engine room on St. Clair Avenue, Toronto, to cost $7,000.

William R. Perin, Ltd., Toronto, has designed and is superintending the installation of a 1000-ton hydraulic forging press for the Dominion Steel Foundries, Ltd., Hamilton, Ont.

The London Canning Company, London, Ont., has been awarded a $3,000,000 contract and it will be necessary to make large additions to the plant. Mr. Goodrum is manager.

Fire caused $3,000 damage to the plant of the Ottawa Steel & Iron Works, 137 Broad Street, Ottawa.

The Brunelle Furnace & Boiler Company, Ltd., Yamachiche, Que., proposes to install electric motors and to equip its machinery for electrical operation. A. Heroux is manager.

Manager Nyberg of the Regal Motor Company, Berlin, Ont., announced that preparations will be made for the erection of a new automobile factory in Berlin.

The Saskatchewan Co-Operative Grain Association will build a grain elevator at Port Arthur, Ont., to have a capacity of 2,500,000 bu. in the first unit, and will be so constructed that other units may be added later. The working house will have a capacity of 500,000 bu.

The Menet-Langton, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Arthur W. Burk, 32 Adelaide Street East; Albert Burnese, 42 River Street; Ronald Macdonald and others to manufacture clothes-pressing machines, etc.

The Jacob Kaufman, Ltd., Berlin, Ont., has been incorporated with a capital stock of $250,000 by Jacob Kauf-

man, Milton R. Kaufman and others to manufacture metal goods, etc.

W. L. Gilman, care of the Brown Corporation, La Tuque, Que., is in the market for a 10 x 12 standard double-cylinder double-drum donkey engine.

The Gill Motor Company, Ltd., Montreal, has been incorporated with a capital stock of $99,000 by Thomas M. Gill, Lewiston, Me.; George M. Smyth, Walter Gill and others of Montreal, to manufacture motors, etc.

The Security Engineering & Contracting Company, Ltd., Montreal, has been incorporated with a capital stock of $25,000 by Arthur Vallee, Arthur R. W. Plimsoll, Reigner Brodeur and others to manufacture steel rollers, engines, etc.

The Powers Accounting Machine Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of $25,000 by Gordon W. MacDougall, Lawrence Macfarlane, William B. Scott and others to manufacture adding machines, etc.

The Doty Engine Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by James S. Lovell, 25 King Street West; William Bain, 185 College Street; John J. Dashwood, 484 Kingston Road, and others of Toronto, to manufacture engines, etc.

The Jewel Mfg. Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $10,000 by Harry H. Hannon and Albert M. Boyington of Hamilton, John S. McConkey and others of London, Ont., to manufacture paper presses, etc.

The Beaverton Toy & Foundry Company, Ltd., Beaverton, Ont., has been incorporated with a capital stock of $60,000 by Benjamin Madill, John P. Heaslip, Martin H. Roach and others to manufacture toys, etc.

The National Amusement Company, Ltd., Montreal, has been incorporated with a capital stock of $15,000 by Joseph O. Lacroix, Oliver Charbonneau and others to manufacture motion picture machines, etc.

The Mainland Engineering Company, Ltd., Victoria, B. C., has been incorporated and will take over the old Mainland Iron Works plant for the manufacture of machinery, tools, etc.

NEW TRADE PUBLICATIONS

Lathe Chucks.—Skinner Chuck Company, New Britain, Conn. Circular. Shows a line of independent lathe chucks which can be furnished in a number of different sizes with either three or four solid reversible jaws. Specification and dimension tables and brief descriptions of the chucks serve to supplement the engravings. Mention is also made of a line of face plate jaws for use on large lathe face plates and boring mill tables.

Duplex Pumps.—A. S. Cameron Steam Pump Works, 11 Broadway, New York City. Bulletin No. 110. Covers a line of duplex pumps of both the piston and plunger types, having simple and compound steam cylinders. Among the fields for which these pumps are recommended are general service, boiler feed, tank service, water works, hydraulic elevators, automatic pumps and receivers and quarry and mining work. A general description of the construction of the pump is presented, the text being supplemented by numerous engravings of the various parts. This is followed by illustrations of the pumps that can be supplied for the classes of service mentioned above with a brief description of the features rendering them adaptable and tables of specifications. Instructions for ordering repair parts and erecting and operating the pumps are included.

Welded Steel Tanks.—Heil Company, Twenty-sixth and Montana avenues, Milwaukee, Wis. Folder. Relates to a line of welded steel tanks of various sizes and shapes for the storage of air, water and gasoline. Views of some of the different styles that can be supplied are presented and mention is made of the work which the company is prepared to do in the repair of machinery and broken castings by the autogenous welding process.

Vertical Surface Grinding Machine.—Blanchard Machine Company, Cambridge, Mass. Catalog. Treats of a high power vertical surface grinding machine equipped for either belt or direct-connected motor drive. Front and rear views of both types of machine are presented, the various features being indicated by arrows pointing to the different parts. A general description of the machine is given, the text being supplemented by numerous halftone and line engravings of the several parts. The different driving arrangements are touched upon and drawings showing the amount of space required and the arrangement of belting and electric conduit are presented. A table of specifications is included and mention is made of various accessories that can be supplied such as a continuous reading caliper attachment and magnetic chuck and face plate.

Portable Electric Radial Drilling Machines.—Cincinnati Electrical Tool Company, Cincinnati, Ohio. Circular. Treats of a portable electric radial drilling machine of the Scotch type, which was illustrated in THE IRON AGE Oct. 21, 1915. An engraving of the machine is presented which is surrounded by text calling attention to the various features and arrows pointing out the different parts to which the several phrases refer. A detailed description of the drill is included.

Corrugated Steel Barrel Cleats.—Hubbard & Co., Pittsburgh, Pa. Folder. Describes a patent corrugated steel cleat for kegs and barrels which was illustrated in THE IRON AGE, Oct. 21, 1915. The special feature of the cleat is the use of a rib reinforcement. Views of the cleat alone and applied to a barrel head are presented.

Belt Treatment.—Pulley-Grip Company, 405 Broadway, Milwaukee, Wis. Folder. Describes briefly what Pulley-Grip is; what it will do in eliminating belt slippage and how it does it. The reasons why it should be used in a plant are also presented and a number of testimonial letters are included.

Blow-off Valves.—Homestead Valve Mfg. Company, Homestead, Pa. Circular. Concerned with a regrinding and removable blow-off valve which was illustrated in THE IRON AGE, Oct. 21, 1915. The several special features of the valve are brought out by a sectional view with arrows running to the various parts and special emphasis is laid upon the ease with which the double Monel metal seat can be reversed. Mention is also made of the use of this valve in connection with one of the builder's quarter-turn valves on boilers to enable the blow-off valve to be renewed or overhauled without closing down the boiler or interfering with the operation of the plant.

Automatic Nut Locks.—Schum Brothers, Metropolitan Tower, New York City. Folder. Deals with an automatic nut lock which operates by having a portion of the thread thrown out of alignment. A view of the lock assembled and separated into the various parts is given. The special advantages claimed for the device, which was illustrated in THE IRON AGE May 7, 1914, are convenience, safety, simplicity and economy. A brief description of the way in which the lock operates is presented.

Oil Reclaimer.—De La Vergne Machine Company, foot of East 138th Street, New York City. Bulletin No. 141. Calls attention to a device for reclaiming lubricating oil that has been used in internal combustion engines. The reclaimer, which was illustrated in THE IRON AGE, Nov. 4, 1915, operates on the gravity settling principle in conjunction with hot water and a special coagulant. A description of the apparatus and the way in which it operates is given and a diagram showing the location in which the reclaimer is installed and instructions for its use are presented.

Mechanical Stokers.—Under-Feed Stoker Company of America, Harris Trust Building, Chicago, Ill. Catalog. Calls attention to the abatement of smoke and saving of fuel effected by the use of an underfeed stoker in both large and small plants. A description of the stoker which is supplemented by numerous engravings is presented, special emphasis being laid upon the automatic control of the fuel and air supplies. A number of views of actual installations of the stokers are presented, and mention is made of some of the special applications that have been made of it, together with line drawings showing the way in which it has been done.

Upright Drilling Machine.—Baker Brothers, Toledo Ohio. Circular. Illustrates a high-speed heavy pattern upright drilling machine which was illustrated in THE IRON AGE, Nov. 4, 1915, as a means of finishing the interior of shell blanks. A description which covers the various parts of the machine in considerable detail is presented, and a condensed table of specifications is included.

Alloy Bronze Castings.—Titanium Alloy Mfg. Company, Niagara Falls, N. Y. Booklet. Describes a line of bronze alloys covering a wide range of engineering specifications. The different alloys are each given a pair of facing pages with a brief description and table of composition and physical properties on one and photomicrographs on the other. Descriptions of the way in which the results given in the various tables were obtained are presented and a number of tables of useful information are included.

Oxygen and Hydrogen Generators.—International Oxygen Company, 115 Broadway, New York City. Catalog No. 2. Refers to a bipolar type of generator for the electrolytic production of oxygen and hydrogen, which was illustrated in THE IRON AGE, Dec. 30, 1915. After a brief discussion of the sources of oxygen supply and the uses to which hydrogen may be put, the features of economy of operation, purity of gas and flexibility are touched upon. This is followed by a description of the generator, the book being supplemented by numerous line and halftone engravings of the various parts. A typical floor plan of a two-unit installation is included.

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